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PHYTOCHEMICAL ANALYSIS AND UV ABSORPTIVITY OF EXTRACTS OF *TELFAIRIA OCCIDENTALIS*, *CELOSIA ARGENTIA* AND *AMARANTHUS HYBRIDUS*

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Abstract

The aim of this study was to characterize and compare the qualitative and quantitative constituents of three different leafy vegetables Telfairia occidentalis, Celosia argentea and Amaranthus hybridus commonly consumed in Nigeria, West Africa. The secondary metabolites in the vegetables were assessed using standard phytochemical screening methods and the active compounds were identified with Gas chromatography- mass spectroscopy (GC-MS) and UV-Visible Spectrophotometry techniques. Pulverized dried leaves of the leafy vegetables were extracted using Soxhlet apparatus with absolute concentration of ethanol and each concentrated plant extract was analyzed. The results of the Gas Chromatography and Mass spectrometry (GC-MS) analyses provided different peaks that indicated the presence of forty-three compounds in A. hybridus, forty T. occidentalis and thirty-six C. argentea. The plant extract was scanned in the wavelength ranging from 200-600nm by using a UV-VIS spectrophotometer, the results showed different peaks ranging from 410-435nm with different absorptions, respectively. Many of the compounds identified to be present in these vegetables have been found to be beneficial to human health and may serve as an active ingredient in the development of therapeutic drugs.

Keywords: Leafy vegetables, Phytochemical analysis, UV-spectroscopy, GC-MS

INTRODUCTION

Leafy vegetables, sometimes known as greens or potherbs, are widely consumed around the world (Spence 2020). They are fast-growing crops that can be harvested in as little as 4-6 weeks after planting. Because these veggies are perishable, they are cultivated in peri-urban regions (Dube et al 2017). Vitamins A and C, and minerals like iron, calcium, and phosphorus are all abundant in leafy leaves (Espinosa-Salas and Gonzalez-Arias, 2023). The health benefits of green leafy vegetables include improving digestive health, balancing cholesterol levels, enhancing youthful skin, treating anemia, strengthening the scalp, fighting free radicals, supporting cardiovascular health, promoting weight loss, boosting energy levels, and extending lifespan (Sarma, 2024).

Telfairia occidentalis is found throughout West and Central Africa's forest zones, with Benin, Nigeria, and Cameroon being the most common. It's a widely consumed vegetable in Nigeria (Mere, 2023). It's thought to have originated in south-east Nigeria and being spread by the Igbos, who have been cultivating this crop since the dawn of time. This plant's leaves are high in proteins, vitamins (B-complex), minerals, fatty acids (linoleic and oleic acids), and fibres, making them a significant element in soups (Akpasi et al., 2023). The plant is also high in glycosides, which when

hydrolyzed produce curcubitacins and glucose (Eseyin *et al*., 2014). The composition of the seed per 100 g edible portion is: water 6.2 g, energy 2280 kJ (543 kcal), protein 20.5 g, fat 45.0 g, carbohydrate 23.5 g, fibre 2.2 g, Ca 84 mg, P 572 mg (Akpasi *et al*., 2023). It has been shown to protect against malignancies of the esophagus, oral cavity, and stomach, maintain blood vessel elasticity, and improve circulation in smokers' arteries (Akang *et al.,* 2015).

Celosia argentea is a widespread vegetable throughout tropical Africa, from Senegal east to Somalia and south to northern South Africa and the Indian Ocean islands, and a traditional vegetable in West and Central Africa (Adegbaju et al., 2019) *Celosia argentea* has been identified in Nigeria (Syed 2018; Adegbaju et al., 2019). It is known as sokoyòkòtò' (Yoruba) in the south-western part of the country. The leaves and stems are cooked into soups, sauces, or stews with other ingredients (Grubben and Denton, 2004) and can be eaten with rice, maize or yam (Fayaz *et al*., 2019). The composition of *Celosia argentea* per 100 g edible portion is: water 83.8 g, energy 185 kJ (44 kcal), protein 4.7 g, fat 0.7 g, carbohydrate 7.3 g, fibre 1.8 g, Ca 260 mg, P 43 mg, Fe 7.8 mg (Adediran *et al*., 2024). It traditionally serves as cure for a variety of ailments like abscesses, colic, cough, diabetes mellitus, diarrhea, dysentery, eczema, gonorrhea, infected sores, liver diseases, menstruation issues, muscle aches, skin eruptions, snakebites, and wounds (Schippers, 2000; Jadhav *et al*., 2022)

Amaranthus hybridus L, sometimes known as "Amaranth or Pigweed," is an annual herbaceous plant that grows to be 1 to 6 feet tall. The leaves are alternating petioled, 3–6 inches long, dull green, rough, hairy, ovate or rhombic with wavy margins, and ovate or rhombic with wavy margins. The flowers are tiny and have greenish or crimson panicles at the end. The taproot is long and fleshy red or pink in colour. The seeds are tiny and lenticellular in shape, averaging 1–1.5 mm in diameter and weighing 0.6–1.2 g per 1000 seeds. It's a common species found in landfills, farmed fields, and barn yards (Bang *et al*., 2021). It's a common species found in landfills, farmed fields, and barnyards. *A. hybridus* leaves are mixed with condiments and used to make soup in Nigeria (Mepha *et al*., 2007; Ejiofor *et al*., 2022). There have been reports of the presence of phytochemicals in the form of phenolics, flavonoids, and alkaloids in the leaves of *A. hybridus*. For instance, Squalene, a chemical with both reported health and industrial benefits, has been identified in considerable concentrations in *A. hybridus* (Smith, 2000; He and Corke, 2003; Ejiofor *et al*., 2017).

Despite the acclaimed widespread use of *Telfairia occidentalis, Celosia argentea and Amaranth hybridus* for medicinal purposes, little is known about the chemical makeup of these leaves that are commonly consumed in Nigeria. Thus, this study sought to analyze the chemical compounds present in leaf extract of *Telfairia occidentalis, Celosia argentea and Amaranthus hybridus* with gas chromatography coupled with mass spectrometry (GC–MS) and characterize the phytochemical constituents.

MATERIALS AND METHODS

Materials

Fresh leaves of *Telfairia occidentalis, Celosia argentia* and *Amaranthus hybridus* were obtained locally from Ibafo market, Ogun state, Nigeria (6^{o} 45' 0" North, 3^{o} 25' 0" East). All chemicals and reagents used were of analytical grade obtained from Sigma Aldrich Ltd, Buchs, Canada. Some of the materials/instruments and equipment used during the course of the investigations include Stirring rod, Warring blender, Rotatory evaporator, Beakers, Funnel, Whatman's No.1 filter paper, Measuring cylinder, Muslin bag, Hot air oven and UV-Visible Spectrophotometer (Jenway 7205)

Preparation of solvent extracts of *T. occidentalis, C. argentia* and *A. hybridus* leaves

A known weight (4kg) *T. occidentalis, C. argentia* and *A. hybridus* leaves was washed separately under running water to remove contaminants and subsequently oven dried at 60^{o}C, to attain a constant weight of 1kg. When completely dry, the leaves were pulverized with a warring electric blender. The powdered material was weighed (0.3kg) and soaked in 1.2L of absolute (concentrated) ethanol for 48hrs.

The extract was sieved with a jute bag and poured in a plastic container and filtered with Whatman's No. 1 filter paper. The filtrate was subjected to the rotary evaporator to recycle back the absolute ethanol (solvent), as well as obtaining the concentrate of the plant sample. The concentrate was kept in a hot air oven at 50^{o}C until completely dry.

Qualitative phytochemical screening analysis

The solvent extract of *T. occidentalis, C. argentia* and *A. hybridus* was tested for the presence of bioactive compounds using standard procedures as described by Roghini and Vijayalakshmi (2018) with slight modification.

UV-Visible spectroscopy

1.14g of *Telfairia occidentalis, Celosia argentia* and *Amaranthus hybridus* was dissolved separated in 40 ml distilled water in a conical flask, each solution was filtered using a filter paper to give a clear solution. The plant sample solution was placed in a clean cuvette, held at the opaque portion of the cuvette and placed in the UV-Visible spectroscopy and read at different wavelengths between 200-600nm to get the different absorbance.

Gas chromatography-mass spectrometry (GC-MS) analysis

The GC-MS study was carried out using a Hewlett Packard Gas Chromatograph (Model 6890 series) fitted with a flame ionization detector and a Hewlett Packard 7683 series 250 °C MS transfer line temperature injector. The GC was fitted with an HP-5MS (30 x 0.25 mm) fused silica capillary column, 1.0 µm film thickness. The oven temperature was kept at 50 ° C for 5 min of held time and increased at a rate of 2 ° C / min from 50 to 250 ° C, using helium gas (99.999 percent) as a carrier gas at a steady flow rate of 22 cm / s. A 1.0micron extract (1 mg diluted in 1 ml of absolute alcohol) was injected at a 1:30 split ratio. Agilent Science Network Mass Spectrometer (Model 5973 series) coupled with Hewlett Packard Gas Chromatograph (Model 6890 series) with NIST08 Library software database was studied by MS. Mass spectra were taken at 70 eV/200 °C, 1 scan/s scanning rate. Compound recognition was carried out using the NIST08 Library database. The mass spectrum of each unknown compound was compared with the known compounds contained in the library software database.

RESULTS AND DISCUSSION

Qualitative phytochemical components of Ethanolic extract of *T. occidentalis, C. argentia* and *A. hybridus* leaves.

Qualitative analysis of ethanoic extract of *T. occidentalis* (Table 1) revealed the presence of phytochemicals such as tannins, saponins, alkaloids, flavonoids, phenols, steroids and coumarins. In *C. argentia,* the presence of carbohydrate, flavonoids, terpenoids, ninhydrin, steroids and coumarins was recorded while analysis carried out on *A. hybridus* leaves revealed the presence of flavonoids, quinones, phenols, terpenoid, cardiaglycosides, steroids and coumarins. Qualitative analysis of phytochemical constituents of aqueous plant extracts is generally employed majorly for the determination of antioxidant function of the plant as well as their potentials as being medicinally beneficial (Yeum and Russell, 2014). Phenolic compounds such as terpenoids and saponins reportedly possess antimicrobial and antioxidant properties (El-Aziz *et al*., 2019).

TABLE 1: Qualitative phytochemical components carried out in ethanol extract of leaves of *T.occidentalis, C. argentia* and *A. hybridus* leaves.

Secondary Metabolites	*A. hybridus*	*T. occidentalis*	*C. argentia*
Carbohydrate	-	-	+
Tannins	-	+	-

Saponins	-	+	-
Alkaloids	-	+	-
Flavonoids	+	+	+
Glycosides	-	-	-
Quinones	+	-	-
Phenols	+	+	-
Terpenoids	+	-	+
Cardiacglycosides	+	-	-
Anthracyanin	-	-	-
Ninhydrin	-	-	+
Steroids	+	+	+
Coumarins	+	+	+
Anthraquinone	-	-	-
Phlobatannins	-	-	-

Key: + Present – Absent

TABLE 2: Phytochemical components identified by GC-MS in ethanol extract of *T. occidentalis* leaves showing the peak, name of compound, Percentage Area, retention time and chemical compound formula

Peak	Name of compounds	Retention Time (min)	Area %	Chemical formula
1	Glycerol triethyl ether	2.449	0.07	$C_{12}H_{20}O_6$
2	1,3-Propanediol	2.574	0.01	$C_3H_8O_2$
3	4b-Methyl-6,8-dioxa-3-thia-bicyclo(3,2,1)octane	2.646	0.04	$C_6H_{10}O_2S$
4	Acetic acid, (1-methylethoxy)-, 1-methylethyl ester D-Fucose Methane, diethoxy-	3.481	5.05	$C_{14}H_{28}O_3$
5	propionic acid, 2-methyl-2,2-dimethyl-1-(2-hydroxy-1-methylethyl)-, propyl ester	3.643	2.94	$C_{14}H_{28}O_3$
6	4-Methyl-1-hexene	3.787	6.67	C_7H_{14}
7	1,2-Dimethylhydrazine	4.032	3.89	$C_2H_8N_2$
8	1-Methyl-2-(3-methylpentyl)cyclopropane	4.581	13.01	$C_{10}H_{20}$
9	1-Vinylimidazole	5.267	0.42	$C_5H_6N_2$
10	7-Methoxy-3,7-dimethyloctanal	5.356	0.24	$C_{11}H_{22}O_2$

11	1-Butanol, 3-methyl-, acetate 1-	5.532	0.18	$C_7H_{14}O_2$
12	dimethyl Peroxide	5.691	0.87	$C_2H_6O_2$
13	2-Hydroxy-2-methylbutanenitrile	5.989	3.26	C_5H_9NO
14	1-[1-(3-Methylbutoxy)ethoxy]pentane	6.719	0.26	$C_{12}H_{26}O_2$
15	Hexanoic acid, ethyl ester	7.216	0.33	$C_8H_{16}O_2$
16	Tridecane -	7.962	0.06	$C_{13}H_{28}$
17	Cyclohexanone, 5-methyl-2-(1-methylethyl)-	8.182	0.04	$C_{10}H_{18}O$
18	Benzeneacetaldehyde	8.415	0.21	C_8H_8O
19	Benzyl alcohol	8.856		C_7H_8O
20	Methyl 4-[[2-butyl-5-[(Z)-[1-butyl-2,5-dioxo-3-[[4-(trifluoromethyl)phenyl]methyl]imidazolidin-4-ylidene]methyl]imidazol-1-yl]methyl]benzoate	9.374	0.59	$C_{32}H_{35}F_3N_4O_4$
21	Ethyl octanoate	9.827	0.50	$C_{10}H_{20}O_2$
22	Buflomedil	10.143	0.13	$C_{17}H_{25}NO_4$
23	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-	10.318	0.47	$C_6H_8O_4$
24	2,6,10,15-Tetramethylheptadecane	10.508	0.24	$C_{21}H_{44}$
25	2-Cyclohexen-1-ol, 2-methyl-5-(1-methylethenyl)-, 1-propanoate, (1S,5R)-	10.827	0.13	$C_{13}H_{20}O_2$
26	Pipecolic acid	11.111	0.94	$C_6H_{11}NO_2$
27	Ethyl decanoate	11.605	1.07	$C_{12}H_{24}O_2$
28	Ethyl 3-oxohexanoate	11.950	1.10	$C_8H_{14}O_3$
29	Methyl piperidine-1-carboxylate	12.281	0.52	$C_7H_{13}NO_2$
30	Pyrido[3,4-d]pyrimidin-4(3H)-one	12.505	0.84	$C_7H_5N_3O$
31	Di-tert-butyl fumarate	12.792	2.35	$C_{12}H_{20}0_4$
32	Alcohols, C9-11, propoxylated	13.393	2.50	$C_{12}H_{26}O$
33	Fumaric acid, ethyl 2-ethylhexyl ester	13.630	1.50	$C_{14}H_{24}O_4$
34	trans-1,2-Dibenzoylethylene	13.787	2.04	$C_{16}H_{12}O_2$
35	1,3-Benzenedicarboxylic acid, 5-sulfo-, 1,3-bis(2-hydroxyethyl) ester, lithium salt (1:1), polymer with 1,4-benzenedicarboxylic acid and 1,2-ethanediol	14.148	2.90	$C_{22}H_{25}LiO_{15}S$
36	Trichloroacetic acid, undec-2-enyl ester	14.486	3.25	$C_{13}H_{21}Cl_3O_2$

37	Phenol, 4-(3-hydroxy-1-propenyl)-	14.783	1.82	$C_9H_{10}O_2$
38	Methylthiomethyl Acetate	15.103	3.75	$C_4H_8O_2S$
39	Hexadecanoic acid, ethyl ester	15.516	3.21	$C_{18}H_{36}O_2$
40	Phytol	16.751	31.22	$C_{20}H_{40}O$

TABLE 3: Phytochemical components identified by GC-MS in ethanol extract of *C. argentia* leaves showing the peak, name of compound, Percentage Area, retention time and chemical compound formula

S/N	Name Of Compound	Retention Time (min)	Area%	Chemical Formular
1	L-Methioninol	2.452	0.27	$C_5H_{13}NOS$
2	2-Amino-1-(4-nitrophenyl)propane-1,3-diol	3.004	0.01	$C_9H_{12}N_2O_4$
3	Cycloserine	3.122	0.03	$C_3H_6N_2O_2$
4	Formic acid, 1-methylpropyl ester	3.553	8.68	$C_5H_{10}O_2$
5	Ethanamine, N-methylene-	3.847	13.30	C_3H_9N
6	1,1-Dimethylhydrazine	4.056	6.99	$C_2H_8N_2$
7	3,7-Dimethyloctan-1-ol	4.616	19.43	$C_{10}H_{22}O$
8	1,3-Dioxolane, 2-(6-octynyl)-	5.270	0.29	$C_{11}H_{18}O_2$
9	Pentyl acetate	5.380	0.54	$C_7H_{14}O_2$
10	Dimethyl peroxide	5.702	2.10	$C_2H_6O_2$
11	2-Hydroxy-2-methylpropanal	5.989	6.65	$C_4H_8O_2$
12	1-(1-Ethoxyethoxy)pentane	6.739	0.56	$C_9H_{20}O_2$
13	Hexanoic acid, ethyl ester	7.218	0.39	$C_8H_{16}O_2$
14	Tert-Butyl (2-(2-(2-(2 bromoethoxy)ethoxy)ethoxy)ethyl)carbamate	8.277	0.26	$C_{13}H_{26}BrNO_5$
15	5-Mercapto-1-methyltetrazole	8.573	0.12	$C_2H_4N_4S$
16	cis-2-Heptene	8.853	0.05	$C_2H_6O_2$
17	2-Butenoic acid, 4-bromo-, methyl ester	9.063	0.00	$C_5H_7BrO_2$
18	Benzeneacetaldehyde	9.475	0.06	C_8H_8O
19	3,5-Dimethylphenol	9.828	0.32	$C_8H_{10}O$
20	Octamethylenediamine, N,N'-bis(o-chlorobenzyl)-, dihydrochloride	10.506	0.11	$C_{22}H_{32}Cl_4N_2$
21	Conhydrine	11.110	0.42	$C_8H_{17}NO$

22	4-(2-Aminoethyl)morpholine	11.397	0.05	$C_6H_{14}N_2O$
23	Decanoic acid, ethyl ester	11.596	0.40	$C_{12}H_{24}O_2$
24	Caprylic anhydride	12.782	2.56	$C_{16}H_{30}O_3$
25	Ethyl (Z)-4-decenoate	13.005	0.89	$C_{12}H_{22}O_2$
26	9-Octadecenoic acid	14.193	8.81	$C_{18}H_{34}O_2$
27	3,7-Dimethyl-6-nonen-1-ol acetate	14.481	2.49	$C_{13}H_{24}O_2$
28	Bis(2-ethylhexyl) adipate	14.791	1.62	$C_{22}H_{42}O_4$
29	Methanol	15.092	2.49	CH_3OH
30	Hexadecanoic acid	16.057	2.69	$C_{16}H_{32}O$
31	Undecanoic acid	16.164	3.74	$C_{11}H_{22}O_2$
32	Dodecyl methacrylate	16.419	0.96	$C_{16}H_{30}O$
33	Bis(2-ethylhexyl) adipate	16.770	0.61	$C_{22}H_{42}O_4$
34	Phytol	16.770	13.44	$C_{20}H_{40}$
35	1,2,3-Trimethylcyclopentane	17.846	0.43	C_8H_{16}
36	1 1'-((3-(Dimethylamino)Propyl)Imino)-	18.452	0.33	$C_{11}H_{26}N_2O_2$

TABLE 4: Phytochemical components identified by GC-MS in ethanol extract of *A. hybridus* leaves showing the peak, name of compound, Percentage Area, retention time and chemical compound formula

Peak	Name of compound	Retention time (min)	% Area	Chemical Compound formular
1	L-Methioninol	2.336	0.04	$CH_3SCH_2CH_2CH(NH_2)CO_2H$
2	Methane, diethoxy-	3.435	4.14	$C_5H_{12}O_2$
3	1-Hexene, 4-methyl-	2.600	2.61	C_7H_{14}
4	Aziridine, 1-(1,1-dimethylethyl)-2,3-dimethyl-, trans-	3.748	10.14	$C_8H_{17}N$
5	Butanoic acid, 3-amino-2-hydroxy-	4.563	12.19	$C_4H_9NO_3$
6	1-Butanol, 3-methyl-, acetate	5.211	78	$C_7H_{14}O_2$
7	Peroxide, dimethyl	5.521	0.18	$C_2H_6O_2$
8	Propanenitrile, 2-hydroxy-	5.690	0.87	C_3H_5NO
9	Pentane, 1-(1-ethoxyethoxy)-	5.975	3.26	$C_9H_{20}O_2$
10	Hexanoic acid, ethyl ester	6.734	0.26	$C_8H_{16}O_2$

11	Sulfurous acid, butyl dodecyl ester	7.216	0.33	$C_{16}H_{34}O_3S$
12	2,4-Heptadienal	7.559	0.03	$C_7H_{10}O$
13	Sulfurous acid, butyl dodecyl esterPropanoic acid, 2,2-dimethyl-, pentyl ester	7.696	0.02	$C_{16}H_{34}O_3S$
14	Benzyl cyclohexanecarboxylate	8.401	0.07	$C_{14}H_{18}O_2$
15	delta-Dodecalactone	8.593	0.03	$C_{12}H_{22}O_3$
16	Bicyclo[2.2.1]heptan-2-ol	8.815	0.03	$C_7H_{12}O$
17	Metacetamol	8.949	0.00	$C_8H_9NO_2$
18	Sulfurous acid, octyl 2-propyl ester	9.089	0.01	$C_{11}H_{24}O_3S$
19	Succinic acid mono-(13-methyl-3-oxo-2,3,6,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-1H-cyclopenta[A]phenanthren-17-YL) ester	9.345	0.06	$C_{22}H_{30}0_5$
20	Octanoic acid, ethyl ester	9.824	0.28	$C_{10}H_{20}O_2$
21	2-Ethyl-p-xylene	10.248	0.04	$C_{10}H_{14}$
22	N-Ethyl-N,2,2-trimethylpropan-1-amine	10.367	0.05	$C_8H_{19}N$
23	Pentanoic acid, 2-methyl-, 1-methylpropyl ester	10.520	0.07	$C_{10}H_{20}O_2$
24	2-Cyclohexen-1-ol, 2-methyl-5-(1-methylethenyl)-, acetate, cis-	10.804	0.03	$C_{12}H_{18}O_2$
25	2-Piperidinoethanol	11.109	0.63	$C_7H_{15}NO$
26	2,3-Dihydrobenzofuran	11.406	0.29	C_8H_8O
27	Decanoic acid, ethyl ester	11.597	0.51	$C_{12}H_{24}O_2$
28	Indole	11.805	0.59	C_8H_7N
29	2,6-Dimethyl-4-p-tolyl-1,4-dihydro-pyridine-3,5-dicarboxylic acid diethyl ester	12.047	0.37	$C_{20}H_{25}NO_4$
30	2,6,10-Trimethyltetradecane	12.311	0.69	$C_{17}H_{36}$
31	2-(1,4,4-Trimethylcyclohex-2-en-1-yl)ethyl p-toluenesulfonate	12.517	1.13	$C_{18}H_{26}O_3S$
32	1-Bromo-2,4-difluorobenzene -	12.775	1.01	$C_6H_3BrF_2$
33	Phenol, 2,6-bis(1,1-dimethylethyl)-4-(1,1,3,3-tetramethylbutyl)-	12.979	0.95	$C_{12}H_{38}O$

34	2(4H)-Benzofuranone, 5,6,7,7a-tetrahydro-4,4,7a-trimethyl-	13.183	1.17	$C_{11}H_{16}O_2$
35	Oxalic acid, cyclobutyl ethyl ester	13.627	2.46	$C_8H_{12}O_4$
37	Di-n-2-propylpentylphthalate	14.213	3.66	$C_{24}H_{38}O_4$
38	2-(Methoxycarbonyl)benzoic acid	14.357	0.74	$C_9H_8O_4$
39	HexadecanaZ	14.479	4.36	$C_{16}H_{32}O$
40	Methyl 4-methoxyphenylacetate	15.103	2.75	$C_{10}H_{12}O_3$
41	Hexadecanoic acid, ethyl ester	15.513	4.36	$C_{18}H_{34}O_4$
42	Octadecane, 1-(ethenyloxy)-	16.775	26.50	$C_{20}H_{40}O$
43	9,12,15-Octadecatrienoic acid,ethyl ester, (Z,Z,Z)-	17.107	10.11	$C_{20}H_{34}O_2$

UV-Visible spectroscopy analysis of ethanoic extract

The Ultra violet -Visible spectroscopy of ethanolic extract of *T. occidentalis* leaves revealed the varying absorbance of the extract at different wavelengths as shown in (Figure 1). From the calibration curve, there was a spontaneous increase in absorbance value at 280nm wavelength, which lags between 310-410nm wavelengths, afterwards decreased. It can be deduced that at wavelength 410nm shows the highest absorbance peak of the most abundant phytoconstituent of *T. occidentalis.* The Ultra violet -Visible spectroscopy of ethanoic extract of *C. argentia leaves* revealed the varying absorbance of the extract at different wavelengths as shown in (Figure 2) From the calibration curve, there was a spontaneous increase in absorbance value at 300nm wavelength, which lags between 310-480nm wavelengths, afterwards decreased. It can be deduced that at wavelength 435nm shows the highest absorbance peak of the most abundant phytoconstituent of *T. occidentalis.* The Ultra violet -Visible spectroscopy of ethanoic extract *A. hybridus* of leaves revealed the varying absorbance of the extract at different wavelength has shown in (Figure 3). From the calibration curve, there was a spontaneous increase in absorbance value at 285nm wavelength, which lags between 310-405nm wavelengths, afterwards decreased. It can be deduced that at wavelength 420nm shows the highest absorbance peak of the most abundant phytoconstituent of *A. hybridus leaves.*

According to Femi-Olabisi et al., (2021), the absorbance of solutions indicates the amount of light that can be absorbed at a specific wavelength and the maximum absorption wavelength could be utilized for the determination of what biomolecules are present in a solution.

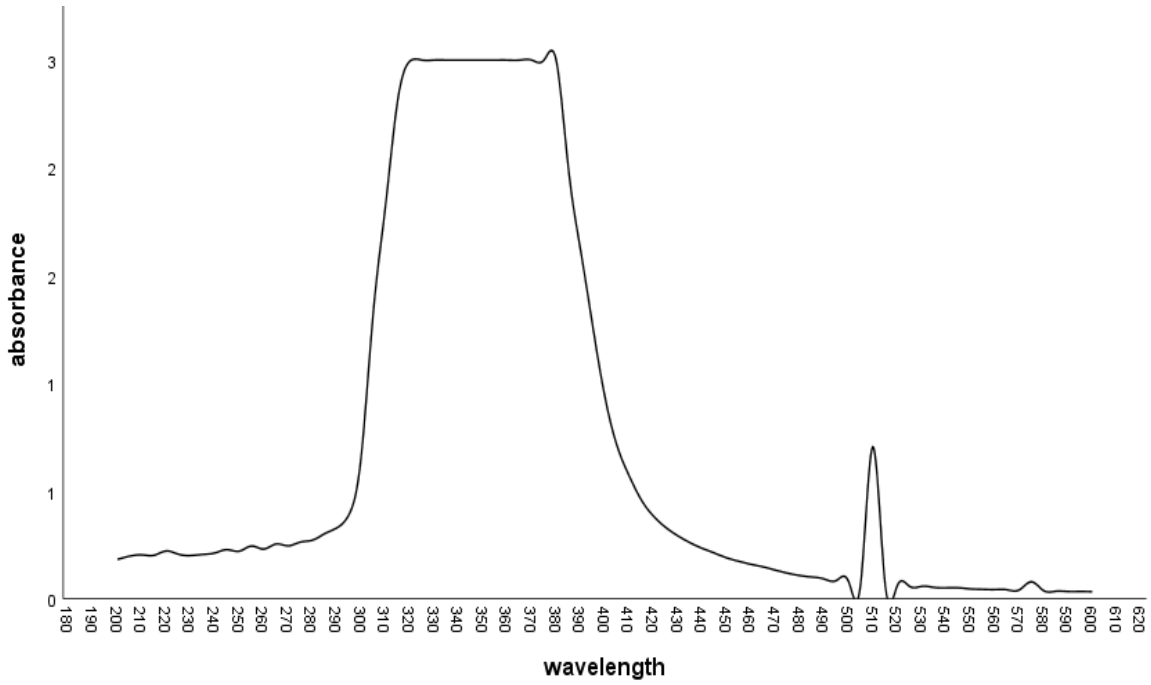

FIGURE 1: Graph of absorbance against wavelength using UV-Vis Spectroscopy analysis of ethanoic extract of *T. occidentalis leaves.*

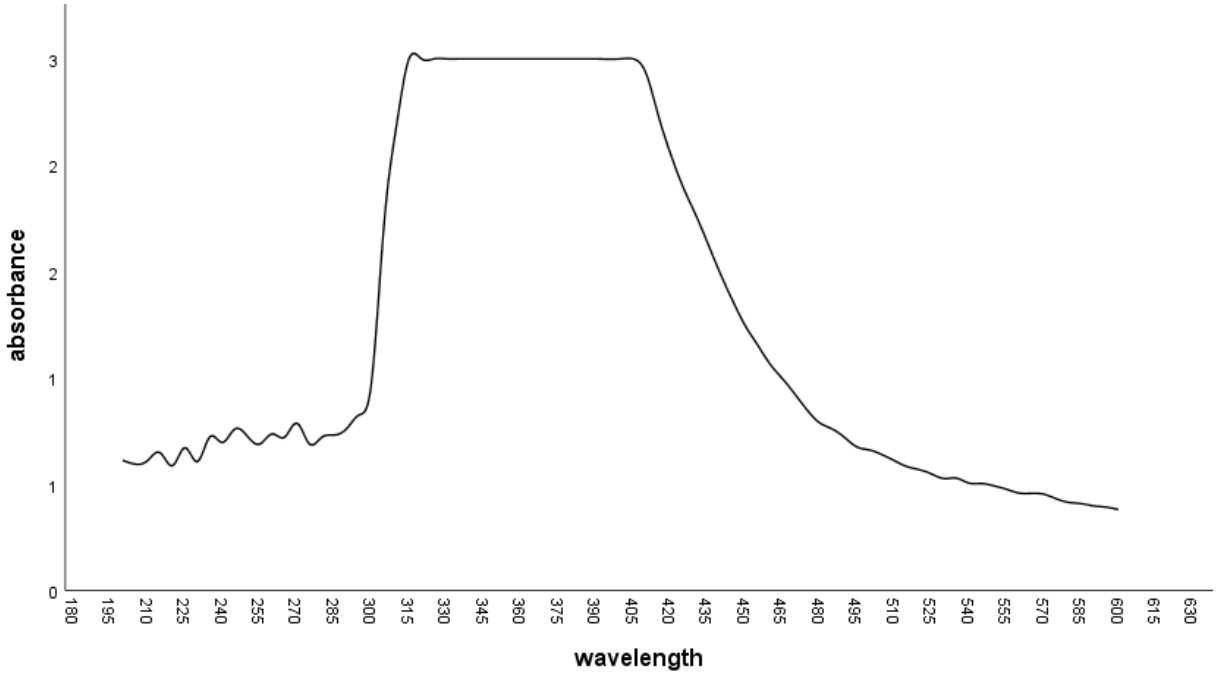

FIGURE 2: Graph of absorbance against wavelength using UV-Vis Spectroscopy analysis of ethanoic extract of *C. argentia.*

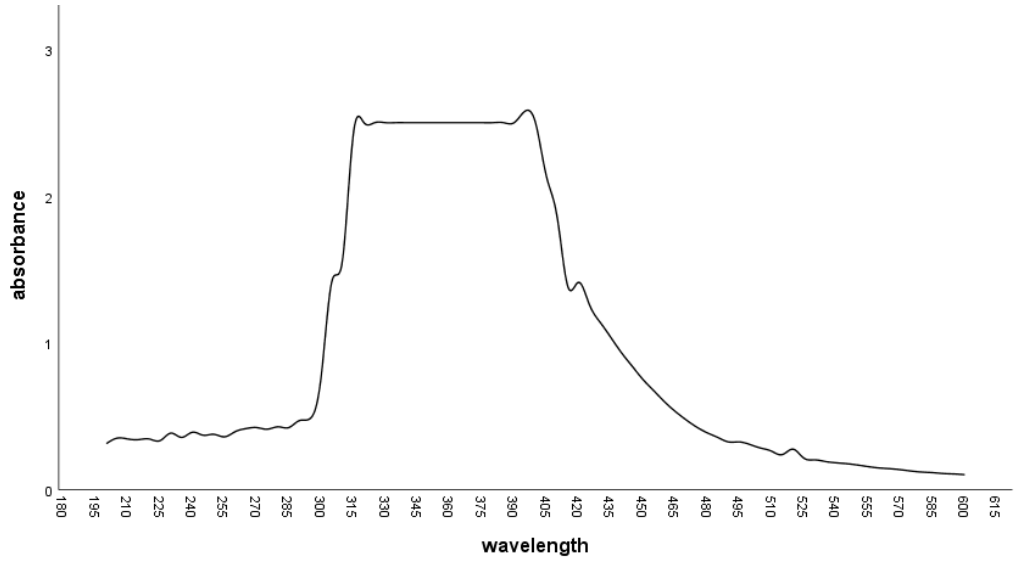

FIGURE 3: Graph of absorbance against wavelength using UV-Vis Spectroscopy analysis of ethanoic extract of *A. hybridus* leaves.

Gas chromatography-Mass spectrometry (GC-MS) analysis.

The GC-MS chromatogram of ethanoic extract of the vegetables revealed the active compounds in the ethanoic extracts and presented on Tables 2-4. At Peak 4 with the retention time of 16.775 min. Octadecane, 1-(ethenyloxy) - ($C_{20}H_{40}O$) was identified as the major phytoconstituent present in *A. hybridus* leaves. Other peaks represented other phytoconstituents present in the plant as presented in Table 3.Octadecane, 1-(ethenyloxy) has also been reported in *Sesamum indicum oil (*Runde *et al*., 2023). Peak 40 with the retention time of 16.751min recorded Phytol ($C_{20}H_{40}O$) as the major phytoconstituent of *T. occidentalis* leaves while other peaks indicated the presence of other phytoconstituents in the plant (Table 2). Investigation has been carried out on phytol to determine its potential metabolism-modulating, antioxidant, anti-inflammatory, antimicrobial effects and immune-modulating ability (Islam *et al*., 2018)

At Peak 42, with the retention time of 4.616 min, 3,7-Dimethyloctan-1-ol $C_{10}H_{22}O$ was identified as the major phytoconstituent of *C. argentia* leaves while other peaks were of other phytoconstituents present in the plant (Table 3). This compound has been identified as a fragrant ingredient which could serve as a pure antimicrobially active substance (Lapczynski*et al*., 2008; Belsito*et al*., 2010)

The GC-MS is considered a proven technique for the identification of bioactive compounds with prospective curative properties present in plants (Uraku *et el*, 2015). This technique is utilized for separation, quantification and identification of analytes present in plant samples. Such specific compounds present in plants have been found to show biological activity in preventing certain illnesses or pathogens.

CONCLUSION

A couple of bioactive compounds with potential health benefits were identified in the vegetables assessed. 3,7-Dimethyloctan-1-ol ($C_{10}H_{22}O$)was the major phytoconstituent identified in *C. argentia,* Phytol, ($C_{20}H_{40}O$) was the major phytoconstituent identified in *T. occidentalis* leaves while Octadecane, 1-(ethenyloxy)-($C_{20}H_{40}O$), was the major phytoconstituent identified in *A. Hybridus* leaves. Wavelength 435nm showed the highest absorbance peak of the most abundant phytoconstituent of *C. argentia*, wavelength 420nm showed the highest absorbance peak of the most abundant phytoconstituent of *A. hybridus* leaves while wavelength 410nm showed the highest absorbance

peak of the most abundant phytoconstituent of *T. occidentalis.*

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