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GC-MS ANALYSIS OF METHANOL EXTRACTS OF *Phragmanthera incana* LEAVES FROM GUAVA, MANGO, CASHEW AND KOLANUT TREES

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ABSTRACT: *Phragmanthera incana (Schum), a specie of mistletoe, belonging to the family Loranthaceae, is a hemi-parasitic plant growing on trees in South-Western part of Nigeria. The chemical composition of P. incana leaves have not been published in literature. Therefore, the chemical constituents of methanol extracts of P. incana leaves hemi-parasitized on Psidium guajava (guava), Cola acuminata (kolanut), Anacardium occidentale (cashew) and Mangifera indica (mango) were analysed using Gas Chromatography-Mass Spectrometry while matching compounds identified with National Institute of Standard and Technology (NIST) library. The GC-MS analysis revealed that P. incana from guava contained 38 bioactive Compounds, P. incana from cashew contained 41 bioactive compounds, P. incana from mango contained 43 bioactive compounds and P. incana from kolanut contained 50 compounds. The chemical constituents detected suggest and also validate the ethnomedicinal claims of the plants as all heals in that, it is rich in diverse compounds of know therapeutic and medicinal activities. Many of the identified constituents has various industrial and medical applications like flavour, antioxidants, anti-inflammatory, hypocholesteremic, hepatoprotective and cancer preventive activities.*

I. INTRODUCTION

Phragmanthera incana (Schum), a specie of mistletoe belonging to the family *Loranthaceae*, is a hemi-parasitic plant that grows on trees in South-Western parts of Nigeria. It is locally referred to as "Afomo Onishana" in Yoruba, "Kauchin" in Hausa and "Awuruse" in Igbo languages in Nigeria [1]. *P. incana* is a woody plant, with stems up to 2 m long; its young parts are densely covered with brown hairs and the berries are red in color [2]. It is majorly found in secondary jungle and bush savanna areas; from Sierra Leone to West Cameroon and Fernando Po Island (Gulf of Guinea that forms part of Equatorial Guinea), and extending across the Congo basin to Zaire, Angola and Nigeria [3]. *P. incana* leaves are rich source of dietary elements essential for biochemical processes and body metabolism [1]. The leaves have been reported to possess antibcterial [4], antihypertensive 5] properties. Ogunmefun et al., [3]) reported the phytochemical analysis of *P. incana* leaves on cocoa and kolanut trees, while the comparative *in vitro* antioxidant potential of the plant leaves were determined by Adeyemi and Osilesi [6] however the chemical composition of *P. incana*

leaves have not been previously published. Therefore this study aimed to determine the chemical constituent of methanol extracts of *P. incana* leaves hemi-parasitic on guava, cashew, mango and kolanut trees.

II. MATERIALS AND METHOD

Plant Material: Collection and Identification

The leaves of *P. incana* were collected from four different host trees viz; Guava *(P. guajava),* kolanut (*C. acuminata*), Cashew (*A. occidentale*) and Mango (*M. indica*) at a forest located at Imota in Ikorodu Local Government Area of Lagos State. The plant was authenticated at Forestry Research Institute of Nigeria (FRIN), Ibadan and herbarium specimen deposited at Forest Herbarium, Ibadan. The leaves were plucked from the stem and cleaned thoroughly with tap water to remove all debris and contaminants, air dried under shade at room temperature for one week, pulverized using mechanical blender and stored in air tight containers for subsequent use.

Preparation of Plant Extract

The dried leaves were pulverized using mechanical grinder and soaked in 70% methanol in ratio 1 to 6 w/v. The mixture was shaken intermittently and left for 48 hours at 28^{o}C. After 48 hours, it was filtered using Whatmann filter paper no 1. The filtrate was concentrated using a rotary evaporator at 40°C. The Gas Chromatography-Mass Spectrophotometry (GC-MS) analysis was carried out on a GC-MS (Model: QP2010SE Shimadzu, Japan) comprising an AOC-20i auto-sampler and gas chromatograph interfaced to a mass spectrometer. The instrument was equipped with a VF5 MS fused silica capillary column of 30 m length, 0.25 mm diameter and 0.25 µm film thickness. The temperatures employed was column oven temperature 80^{o}C, injection temperature 250^{o}C at a pressure of 108.0 KPa with total flow and column flow of 6.20 mL/min and 1.58 mL/min respectively. The linear velocity was at 46.3 cm/sec and a purge flow of 3.0 mL/min. The GC program on source and interface temperatures was 230 ^{o}C and 250 ^{o}C respectively with solvent cut time of 2.50 min. The mass spectrum program starting time was 3.00 min and ended at 28.00 min with event time of 0.50 sec, scan speed of 1250 µL/sec, scan range 40-800 u and an injection volume of 1 µL of the plant extract (split ratio 1.0). The total running time of GC-MS was 28 mins.

Identification of components

Identification of components in the methanol extract was based on the molecular structure, molecular mass and its fragments. The relative percentage of the analyte was expressed as a percentage with peak area normalization. Interpretation on the mass spectrum was conducted using the database of National Institute of Standards and Technology (NIST). The fragmentation pattern spectra of the unknown components were compared with those of known components stored in the NIST library (NIST version. 2.0, 2005). The relative percentage of each phytocomponent was calculated by comparing its average peak area to the total area. The name, molecular weight and structure of the components of the test materials was ascertained in the absence of pure standards.

III. RESULT AND DISCUSSION

The percentage yield of leaf extracts of *P. incana* leaves in 70% methanol extract were 17.13% for *P. incana* leaves from *P. guava*, 16.28% for *P. incana* from kolanut, 12.55% for *P. incana* from cashew *and* 13.88% for *P. incana* from Mango. The methanol extract of *P. incana* leaf from guava had the highest (17.13%) percentage yield whereas the lowest (12.55%) percentage yield was from *P. incana* from cashew.

The GC-MS data isolated and identify the structure of chemical constituents present in

methanol extracts of *P. incana* leaves from guava, cashew, mango and kolanut with percentage purity above 70%. Result of the GC-MS analysis revealed that *P. incana* leaves from Guava contained 38 Compounds which includes; 9,12-Octadecanoic acid (z-z)-methyl ester (1.0%), Benzofuran,2,3-dihydro (11.28%), 2(5H)-Furanone (1.35%), Z-11-Pentadecenol (1.59%), Methyl stearate (1.81%), 11-Octadecenoic acid, methyl ester (2.43%), Hexadecanoic acid, methyl ester (2.59%), methyl-(2-hydroxy-3-ethoxy (2.92%), cyclohexene,3,4-diethenyl-cis (4.24%), Benzene ethanol, 4-hydroxy- (5.74%), 2,3-Butanediol (6.54%), Benzoic acid, 4-hydroxy-3,5-dimethoxy-, hydrazide (8.61%), Benzoic acid, 3,4,5-trimethoxy-, methyl ester (9.31%), Benzoic acid, 4-hydroxy-3,5-dimethoxy- (8.69%), 1,2-Benzenediol, 3-methoxy (10.38%), Phenol, 2,6-dimethoxy- (18.0%) as shown in (Table 1). *P. incana* leaves from Cashew contained 41compounds which include Catechol (2.58%), Methyl Sterate, (2.60%), Centrimonium bromide (4.18%), Hexadecanoic acid, methylester (4.92%), Phenol 2,6-dimethyl (5.35%), 5,5 8a-Trimethyl-3,5,6,7,8,8a-hexahydro-2H (6.24%), 9-octadecenoic acid, metyl ester (7.39%), 2-cyclohexen-1-one, 4-(3-hydroxy-1-butenyl) (8.12%), 2,3-Butanediol (8.2%) (Tables 2). *P. incana* leaves from Mango contained 43 compounds which includes, Phenol (1.47%), Benzoic acid, 4-hydroxy-3,5-dimethoxyl hydrazide (7.00%), Benzoic acid, 4-hydroxy-3,5 dimethoxyl hydrazide (8.33%), 1,2-Benzenediol,3-methoxy (10.02%), Benzoic acid, 3,4,5-trimethoxy methyl ester (10.79%), Benzene ethanol, 4-hydroxyl (12.28%), Phenol, 2,6-dimethoxy (15.28%) (Tables 3). *P. incana* leaves from Kolanut contained 50 compounds which include Phenol (2.06%), 9,12-Octadecadienoic acid z,z-methyl ester (2.07%), 15-hydroxypentadecanoic acid (2.14%), 8-chlorocapric acid (2.50%), Methyl Stearate (2.60%), Benzyl alcohol (2.75%), Phenol 2,6-dimethoxy (3.83%), Dehydromevalonic lactone (4.72%), Butanediol (4.94), Hexadecanoic acid, methyl ester (7.48%) 5,5,8a-trimethyl-3,5,6,7,8,8a hexahydro-2H (7.49%) (Tables 4). It was observed that all the four host trees contains high amount of Phenolic compounds, monoterpenes hydrocarbon, fatty acids methyl esters Linoleic acid, linolenic acids and Palmitic acids, which have been reported for antioxidants, hypocholesteremic activities, nematicide, pesticide, antiandrogenic, flavour, haemolytic, anti-inflammatory, hepatoprotective, antihistamine, cancer preventive, antiarthritic, antiacne and antieczemic activities [8]

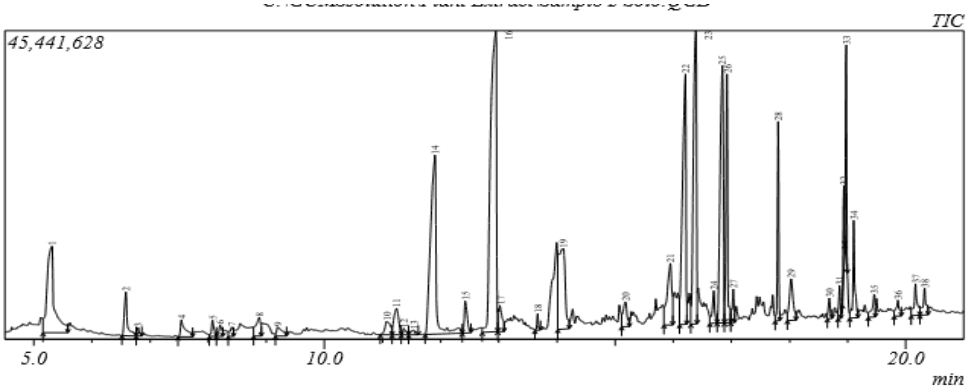

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Table 1: Gas Chromatography-Mass Spectrometry (GC-MS) analysis of methanol extract of *P. incana* leaves from Guava

Peak #	Retention Time	Area %	Heights %	Library ID
1	5.309	6.54	2.99	2,3-Butanediol
2	6.583	1.35	1.51	2(5H)-Furanone
3	6.792	0.20	0.29	Cyclohexanone
4	7.541	0.87	0.59	Phenol
5	8.073	0.45	0.56	4(H)-Pyridine, N-acetyl
6	8.202	0.38	0.40	1-Pyrrolidineethanamine
7	8.401	0.31	0.32	1-Deoxy-d-mannitol
8	8.879	0.92	0.65	2-Butanone, 4-hydroxy-3-methyl-
9	9.194	0.54	0.31	Phenol, 2-methoxy-
10	11.067	0.78	0.47	Catechol
11	11.235	1.28	0.92	Benzofuran, 2,3-dihydro-
12	11.360	0.26	0.22	Oxirane, decyl-
13	11.536	0.20	0.16	2(3H)-Benzofuranone, hexahydro-7a-methyl
14	11.901	10.38	6.18	1,2-Benzenediol, 3-methoxy-
15	12.419	0.99	1.11	2-Methoxy-4-vinylphenol
16	12.948	18.00	10.37	Phenol, 2,6-dimethoxy-
17	13.019	0.98	0.90	11-(2-Cyclopenten-1-yl)undecanoic acid, (+)-
18	13.665	0.24	0.57	Pyrrolidine, 1-(1-cyclohexen-1-yl)-
19	14.106	5.74	2.77	Benzeneethanol, 4-hydroxy-
20	15.174	1.02	0.87	2-Furanmethanol, 5-ethenyltetrahydro-.alpha
21	15.950	2.92	2.12	Methyl-(2-hydoxy-3-ethoxy-benzyl)ether
22	16.205	8.69	8.64	Benzoic acid, 4-hydroxy-3,5-dimethoxy-
23	16.386	9.31	10.11	Benzoic acid, 3,4,5-trimethoxy-, methyl ester
24	16.691	0.81	1.13	4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphenol
25	16.840	8.61	8.88	Benzoic acid, 4-hydroxy-3,5-dimethoxy-, hydrazide
26	16.926	4.24	8.58	Cyclohexene, 3,4-diethenyl-, cis-
27	17.034	0.63	1.16	6-Methyl-cyclodec-5-enol
28	17.802	2.59	6.88	Hexadecanoic acid, methyl ester
29	18.023	1.59	1.43	Z-11-Pentadecenol
30	18.683	0.42	0.71	Bicyclo[3.3.1]non-2-en-9-ol, anti-
31	18.860	0.52	1.14	2-Tetradecanone
32	18.932	1.00	2.97	9,12-Octadecadienoic acid (Z,Z)-, methyl ester
33	18.972	2.43	7.40	11-Octadecenoic acid, methyl ester
34	19.101	1.81	3.36	Methyl stearate
35	19.453	0.69	0.79	Bicyclo[3.3.1]non-2-en-9-ol, anti
36	19.865	0.53	0.53	Cyclopentadecanone, 2-hydroxy-
37	20.165	0.95	0.95	15-Hydroxypentadecanoic acid
38	20.321	0.85	0.85	7-Hexadecenoic acid, methyl ester, (Z)-

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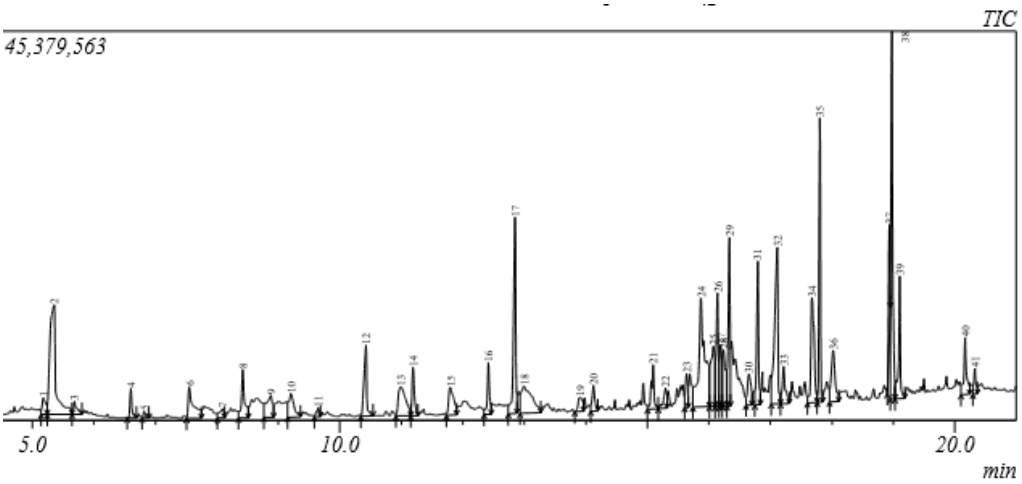

Table 2: Gas Chromatography-Mass Spectrometry (GC-MS) analysis of methanol extract of *P. incana* leaves from Cashew

Peak #	Retention Time	Area %	Height %	Name of Compound
1	5.176	0.74	0.55	1,2-Propanediol diformate
2	5.354	8.12	3.67	2,3-Butanediol
3	5.681	0.57	0.44	2-Cyclopenten-1-one
4	6.600	0.68	0.99	2(5H)-Furanone
5	6.814	0.18	0.23	2(3H)-Furanone, 5-methyl-
6	7.552	2.02	1.06	Phenol
7	8.089	0.48	0.32	Bicyclo[3.1.0]hexan-2-ol, acetate, (1.alpha.,
8	8.417	1.75	1.62	Benzyl alcohol
9	8.880	1.65	0.74	2-Butanone, 4-hydroxy-3-methyl-
10	9.204	1.50	0.79	N,N-Dimethyl-O-(1-methyl-butyl)-hydroxyl
11	9.647	0.34	0.31	Pyrimidine-4,6-diol, 5-methyl-
12	10.424	2.35	2.39	Dehydromevalonic lactone
13	10.989	2.58	0.97	Catechol
14	11.186	1.34	1.62	Benzofuran, 2,3-dihydro-
15	11.795	1.72	0.94	1,2-Benzenediol, 3-methoxy-
16	12.411	1.33	1.73	2-Methoxy-4-vinylphenol
17	12.850	5.35	6.60	Phenol, 2,6-dimethoxy
18	12.994	3.47	0.92	.alpha.-D-Galactopyranoside, methyl
19	13.906	0.78	0.48	Benzeneethanol, 4-hydroxy-
20	14.121	0.98	0.87	Methylparaben
21	15.091	1.38	1.49	2-Hexene, 1,1-diethoxy-
22	15.291	0.81	0.68	Bicyclo[3.3.1]nonan-9-one, 1,2,4-trimethyl-3
23	15.640	0.94	1.14	9,9-Dimethoxybicyclo(3.3.1)nona-2,4-dione
24	15.871	8.12	3.65	2-Cyclohexen-1-one, 4-(3-hydroxy-1-butenyl
25	16.073	2.94	2.03	.alpha.-D-Galactopyranoside, methyl
26	16.138	3.01	3.82	Benzoic acid, 4-hydroxy-3,5-dimethoxy-, hydrazide
27	16.190	1.71	2.07	.alpha.-D-Glucopyranoside, methyl
28	16.235	2.08	1.89	.alpha.-D-Glucopyranoside, methyl
29	16.331	3.61	5.67	Benzoic acid, 3,4,5-trimethoxy-, methyl ester
30	16.647	1.30	1.05	3-Hydroxymethylene-1,7,7-trimethylbicyclo

31	16.790	3.11	4.83	Benzoic acid, 4-hydroxy-3,5-dimethoxy-, hydrazide
32	17.113	6.24	5.27	5,5,8a-Trimethyl-3,5,6,7,8,8a-hexahydro-2H
33	17.215	1.38	1.26	1,2,4-Trioxolane-2-octanoic acid, 5-octyl-,
34	17.674	4.18	3.53	Cetrimonium Bromide
35	17.802	4.92	9.57	Hexadecanoic acid, methyl ester
36	18.016	2.38	1.72	3-(1-Methylhept-1-enyl)-5-methyl-2,5-dihydrofuran
37	18.931	1.62	3.87	9,12-Octadecadienoic acid (Z,Z)-, methyl ester
38	18.973	7.39	12.36	9-Octadecenoic acid, methyl ester, (E)-
39	19.100	2.60	4.11	Methyl stearate
40	20.165	1.75	1.92	15-Hydroxypentadecanoic acid
41	20.323	0.62	0.86	Methyl 16-hydroxy-hexadecanoate

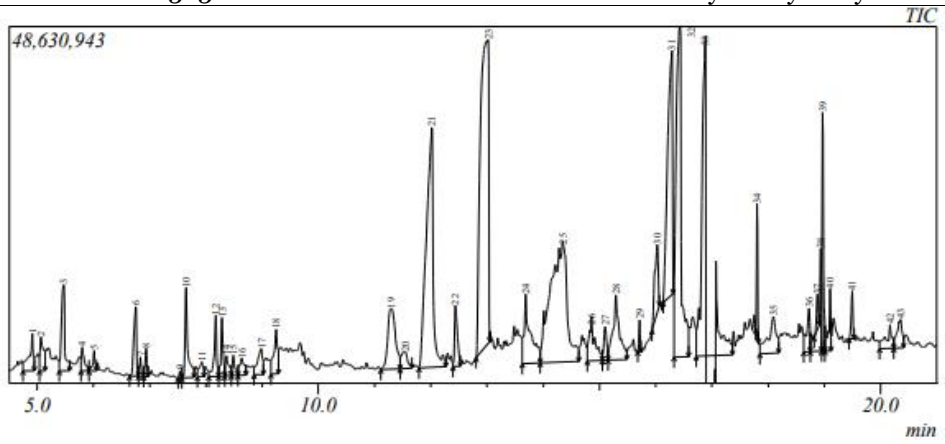

Table 3: Gas Chromatography-Mass Spectrometry (GC-MS) analysis of methanol extract of *P. incana* leaves from Mango

Peak #	Retention Time	Area %	Height %	Name of compound
1	4.915	0.89	1.09	Ethanol, 2-methoxy-, carbonate (2:1)
2	5.068	0.71	0.99	Succindialdehyde
3	5.471	1.82	2.52	2,3-Butanediol
4	5.798	0.42	0.70	Propanenitrile, 3-(dimethylamino)-
5	6.015	0.29	0.60	2-Furanmethanol
6	6.753	1.13	2.04	2(5H)-Furanone
7	6.833	0.22	0.56	1-Methyl-1-vinyl-1-silacyclobutane
8	6.936	0.29	0.83	6-Oxa-bicyclo[3.1.0]hexan-3-one
9	7.541	0.06	0.20	1-Cyclopenten-3-one, 1-(ethoxycarbonyloxy
10	7.649	1.47	2.65	Phenol
11	7.925	0.37	0.45	Bicyclo[4.1.0]heptan-2-ol, (1.alpha.,2.beta.,
12	8.174	0.90	1.80	4(H)-Pyridine, N-acetyl-
13	8.283	0.76	1.71	Pyrrolidin-1-acetic acid
14	8.363	0.42	0.60	1,2-Cyclopentanedione, 3-methyl-
15	8.484	0.33	0.59	3-O-Benzyl-d-glucose
16	8.642	0.51	0.51	Pantolactone
17	8.988	0.78	0.75	3-Allyloxy-1,2 propanediol
18	9.249	0.99	1.30	Mequinol
19	11.286	2.95	1.77	Benzofuran, 2,3-dihydro-
20	11.547	0.65	0.50	3-Ethenylheptan-2,6-dione
21	12.019	10.02	7.01	1,2-Benzenediol, 3-methoxy-
22	12.436	1.07	1.78	2-Methoxy-4-vinylphenol
23	13.021	15.28	8.89	Phenol, 2,6-dimethoxy-

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24	13.685	2.64	2.04	2-Amino-8-[3-d-ribofuranosyl]imidazo[1,2-a
25	14.355	12.28	3.50	Benzeneethanol, 4-hydroxy-
26	14.863	1.44	1.17	1H-Benzocyclohepten-7-ol, 2,3,4,4a,5,6,7,8-octahydro
27	15.103	0.58	0.97	1,2,4-Cyclopentanetrione, 3-(2-pentenyl)-
28	15.294	2.52	1.73	Verbenol
29	15.716	0.21	0.92	Aromandendrene
30	16.028	1.49	1.99	Phenol, 4-(ethoxymethyl)-2-methoxy-
31	16.288	7.00	7.13	Benzoic acid, 4-hydroxy-3,5-dimethoxy-, hydrazide
32	16.429	10.79	9.66	Benzoic acid, 3,4,5-trimethoxy-, methyl ester
33	16.877	8.33	9.11	Benzoic acid, 4-hydroxy-3,5-dimethoxy-, hydrazide
34	17.802	0.83	3.90	Hexadecanoic acid, methyl ester
35	18.092	1.77	1.04	Z-11-Pentadecenol
36	18.727	0.85	1.28	Tyramine, N-formyl-
37	18.875	0.36	1.05	2-Tetradecanone
38	18.933	1.72	3.02	Cyclopropaneoctanoic acid, 2-[[2-[(2-ethylcyclopropyl
39	18.969	1.96	6.98	Methyl stearate
40	19.101	0.75	1.82	Bicyclo[2.2.1]heptan-2-one, 1-ethenyl-7,7-dimethyl
41	19.490	0.48	1.40	Bicyclo[2.2.1]heptan-2-one, 1-ethenyl-7,7-dimethyl
42	20.170	0.78	0.62	15-Hydroxypentadecanoic acid
43	20.354	0.92	0.84	Undecyl 2,3,4,5,6-pentafluorobenzoate

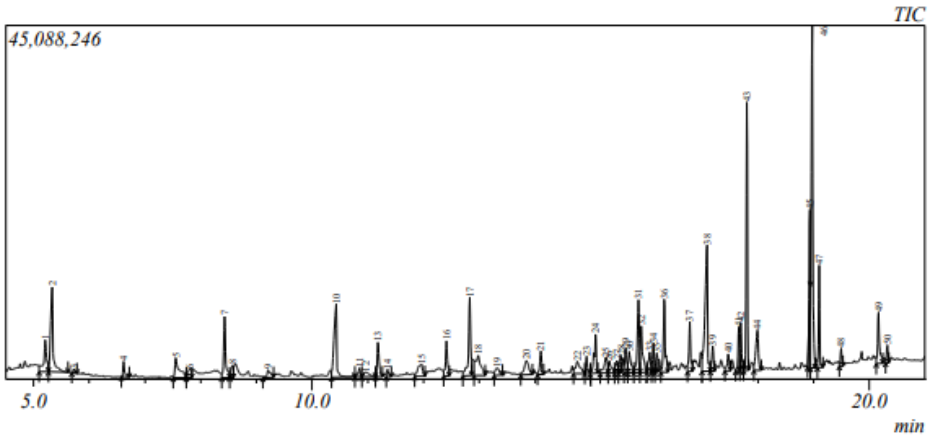

Table3: Gas Chromatography-Mass Spectrometry (GC-MS) of methanol extract of *P. incana* leaves from kolanut

Peak	Retention Time	Area %	Height %	Library ID
1	5.210	2.08	1.41	1,2-Propanediol diformate
2	5.331	4.94	3.77	2,3-Butanediol
3	5.716	0.13	0.18	5-Hexen-2-ol, 5-methyl-
4	6.615	0.57	0.69	2(5H)-Furanone
5	7.555	2.06	0.88	Phenol
6	7.806	0.76	0.41	1,6-Anhydro-2,4-dideoxy-.beta.-D-ribo-hexo
7	8.425	2.75	2.73	Benzyl alcohol
8	8.567	0.70	0.55	Pantolactone
9	9.210	0.70	0.33	3-Cyclohexen-1-carboxaldehyde, 3-methyl-
10	10.431	4.72	3.27	Dehydromevalonic lactone
11	10.849	0.49	0.41	Methyl salicylate
12	10.959	0.60	0.21	Catechol
13	11.178	1.60	1.54	Benzofuran, 2,3-dihydro-
14	11.349	0.35	0.33	4-Methyl-trans-3-oxabicyclo[4.4.0]decane
15	11.963	1.43	0.53	dl-Mevalonic acid lactone

16	12.408	1.57	1.56	2-Methoxy-4-vinylphenol
17	12.832	3.83	3.49	Phenol, 2,6-dimethoxy-
18	12.983	2.50	0.89	8-Chlorocapric acid
19	13.316	0.64	0.32	.alpha.-Methyl-.alpha.-[4-methyl-3-pentenyl]o
20	13.844	1.47	0.63	Benzeneethanol, 4-hydroxy-
21	14.100	1.06	1.04	Methylparaben
22	14.758	1.34	0.55	Stevioside
23	14.924	0.58	0.77	Silane, (1,1-dimethylethyl)dimethyl[(1-methyl
24	15.086	1.94	1.75	2-Hexene, 1,1-diethoxy-
25	15.267	1.26	0.69	2-Methyl-4-(2,6,6-trimethylcyclohex-1-enyl
26	15.331	0.84	0.55	Ethanone, 1-(1a,2,3,5,6a,6b-hexahydro-3,3,
27	15.468	0.69	0.55	Z-11-Pentadecenol
28	15.543	0.83	0.80	3H-3,10a-Methano-1,2-benzodioxocin-3-ol, o
29	15.629	1.08	1.09	3-Hydroxy-7,8-dihydro-.beta.-ionol
30	15.693	1.26	0.94	Megastigmatrienone
31	15.858	3.31	3.26	2-Cyclohexen-1-one, 4-(3-hydroxy-1-butenyl
32	15.909	2.35	2.08	4,4,5,8-Tetramethylchroman-2-ol
33	16.059	1.05	0.90	1H-Cycloprop[e]azulen-4-ol, decahydro-1,1,4
34	16.125	1.00	1.29	Benzoic acid, 4-hydroxy-3,5-dimethoxy-, h
35	16.185	0.84	0.86	1-Hydroxymethyl-3,3-dimethyl-2-(3-methylb
36	16.319	3.02	3.25	Benzoic acid, 3,4,5-trimethoxy-, methyl ester
37	16.774	1.89	2.23	Benzoic acid, 4-hydroxy-3,5-dimethoxy-, hydrazide
38	17.088	7.49	5.63	5,5,8a-Trimethyl-3,5,6,7,8,8a-hexahydro-2H
39	17.192	1.02	1.12	Emicymarin
40	17.468	0.85	0.76	Acetic acid, 10,11-dihydroxy-3,7,11-trimeth
41	17.656	1.40	1.95	Benzoic acid, 2-hydroxy-, phenylmethyl ester
42	17.692	1.45	2.12	3,5-Dimethoxy-4-hydroxyphenethylamine
43	17.801	7.48	11.93	Hexadecanoic acid, methyl ester
44	17.989	2.40	1.80	2,5,5,6,8a-Pentamethyl-trans-4a,5,6,7,8,8a-he
45	18.930	2.07	4.23	9,12-Octadecadienoic acid (Z,Z)-, methyl ester
46	18.973	11.72	15.25	9-Octadecenoic acid, methyl ester, (E)-
47	19.099	2.60	4.58	Methyl stearate
48	19.490	0.57	0.80	8,11-Octadecadienoic acid, methyl ester
49	20.164	2.14	2.29	15-Hydroxypentadecanoic acid
50	20.322	0.60	0.79	Methyl 16-hydroxy-hexadecanoate

CONCLUSION

The GC-MS data affirm the presence of all chemical constituents in the methanol extracts of *P. incana* leaves. This phytoconstituents detected suggest and also validate the ethnomedicinal claims of the plants as all heals in that it is rich in diverse compounds of know therapeutic and medicinal activities such as antioxidant, antibacterial, antifungal, antimicrobial, antihypertensive, antisparmodic, anticancer and hypocholesteremic activities.

Conflict of Interest

The authors declares that there is no conflict of interest

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