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Comparative phytochemical profile of *Indoneesiella echioides* (L.) Nees leaves using GC-MS

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Abstract

Indoneesiella echioides (or) *Andrographis echioides* (L) Nees is an important herb widely distributed in south India. This is commonly known as False Water willow. *Indoneesiella echioides* (L) Nees is a traditional Indian medicine; the whole plant is highly medicinal value such as the leaf juice of this plant is used to cure fever. Different pharmacological properties of *Indoneesiella echioides* have already been reported. Thus, the present study was performed to investigate the preliminary phytochemical screening, separation, identification of compounds and compare the phytochemical composition of various fraction of *Indoneesiella echioides* using gas chromatography-mass spectrometry. The plant was extracted for various solvents in increasing order of polarity from using n-hexane, chloroform, ethyl acetate, acetone, ethanol, butanol and methanol. The result obtained after GC-MS studies were confirmed by spectral analysis.

Keywords: *Indoneesiella echioides* (L) Nees, phytochemical screening, separation and identification of compounds, GC-MS studies, spectral analysis

1. Introduction

Indoneesiella echioides (L) Nees (Acanthaceae), also known as *Andrographis echioides* (L) Nees. This is commonly known as False Water Willow, is an abundantly growing in south India. *Indoneesiella echioides* (L) Nees is highly medicinal important. The genus of *Indoneesiella* is used in goiter, liver diseases [1], fertility problems, bacterial [2], malarial and fungal disorders. The leaf juice of this plant is used to treating fever [3]. Several *Indoneesiella* species (about 40 species) has been used in treatment of influenza, malaria, dyspepsia and respiratory diseases. The *Indoneesiella* species also used to antidote for poisonous stings of some insects [4, 5]. The leaf juice is mixed and boiled with coconut oil used to control falling and greying of hair [6]. Phytochemistry of *Indoneesiella echioides* has been investigated and reported to contain several flavonoids [7, 8] and labdane diterpenoids [9-14]. In previous literatures are reported to only flavonoids as a major component in *Indoneesiella echioides* (L) Nees extracts [15-18]. It has been reported that variety of phytoconstituents like phenols, coumarins, lignans, essential oil, monoterpenes, carotenoids, glycosides, flavonoids, organic acids, lipids, alkaloids and xanthene's [19]. Hence the present investigation was carried out to determine the possible phytochemical compounds of *Indoneesiella echioides* by GC-MS studies.

2. Materials and methods

2.1. Collection of plant materials

The leaves of *Indoneesiella echioides* was collected from Poondi village, Thanjavur District, Tamilnadu. The botanical identity (Voucher No: A.A.R 001 on 04-02-2015) of the plant was confirmed by Dr. S. John Britto, Rapinat Herbarium, St. Joseph's College, Tiruchirappalli.

2.2. Preparation of Extracts

The fine powder (5 kg) was extracted with 95% ethanol at room temperature for ten days. The extract were filtered and concentrated under reduced pressure in a rotary evaporator and extracted for various solvents in increasing order of polarity from using n-hexane, chloroform, ethyl acetate, acetone, ethanol, butanol and methanol. After that the extract was taken in a beaker and kept in a water bath and heated at 30-40° C till all the solvent got evaporated. The dried extracts were subjected to preliminary phytochemicals and GC -MS studies. All the extracts were tested for the presence bioactive compounds by using standard methods.

2.3. Phytochemical screening

The preliminary phytochemical analysis of *Indoneesiella echioides* (L) Nees was carried out as per standard methods (Table.1).

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Table 1: Preliminary phytochemical constituents of *Indoneesiella echioides* (L) Nees leaves.

S.N	Phytochemicals	Hexane Extract	Chloroform Extract	Ethyl acetate Extract	Acetone Extract	Ethanol Extract	Butanol Extract	Methanol Extract
1.	Alkaloids	-	-	-	Present	Present	-	-
2.	Flavonoids	-	Present	Present	Present	Present	Present	Present
3.	Terpenes	Present	Present	-	-	-	-	-
4.	Triterpenoid saponins	-	Present	Present	Present	-	-	-
5.	Saponins	-	Present	Present	Present	Present	Present	Present
6.	Glycosides	-	-	-	-	-	-	-
7.	Steroids	Present	Present	Present	Present	-	-	-
8.	Carbohydrates	-	-	-	-	-	-	-
9.	Phenolic compounds	Present	Present	Present	Present	-	Present	Present
10.	Tannins	-	-	-	-	-	-	-
11.	Amino acids	-	-	Present	Present	Present	-	Present

2.4 GC-MS Analysis

2.4.1 Identification of phytochemicals

GC-MS is one of the most reliable biophysical method for its specificity and repeatability, was utilized for the phytochemical profiling *Indoneesiella echioides* (L) Nees leaves. Interpretation on Mass-Spectrum GC-MS was conducted using the database of National institute Standard and Technology (NIST) having more 62,000 patterns. The spectrum of the unknown components was compared with the spectrum of known components stored in the NIST library. The name, molecular weight and structure of the components of the test materials were ascertained. In the present study many phytochemical constituents have been identified from various fractions of *Indoneesiella echioides* (L) Nees leaves by GC-MS analysis (Table. 2, 3, 4, 5, 6 and 7).

3. GC – MS spectrum of n-hexane extract of *Indoneesiella echioides* (L) Nees leaves.

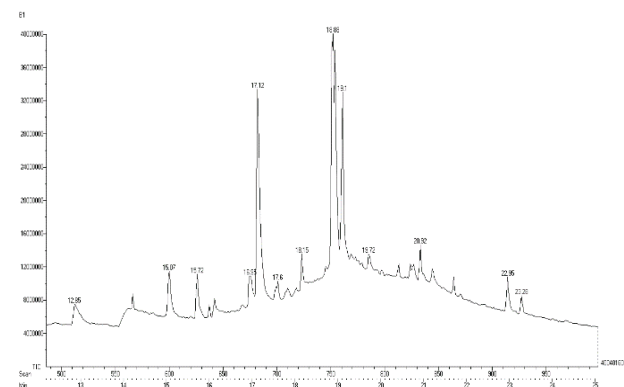


Fig 1: GC – MS with n-hexane extract of *Indoneesiella echioides* (L) Nees plant leaves.

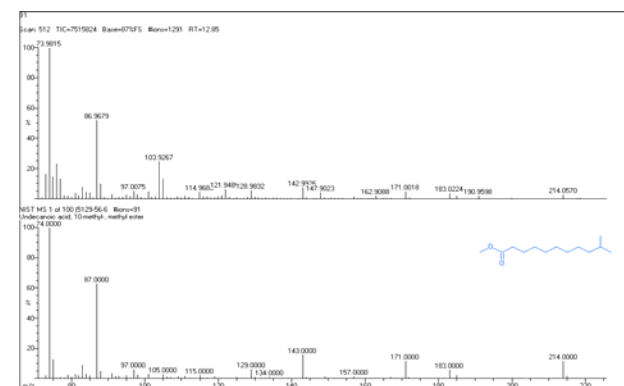


Fig 2: Mass spectrum of Undecanoic acid, 10-methyl-, methyl ester.

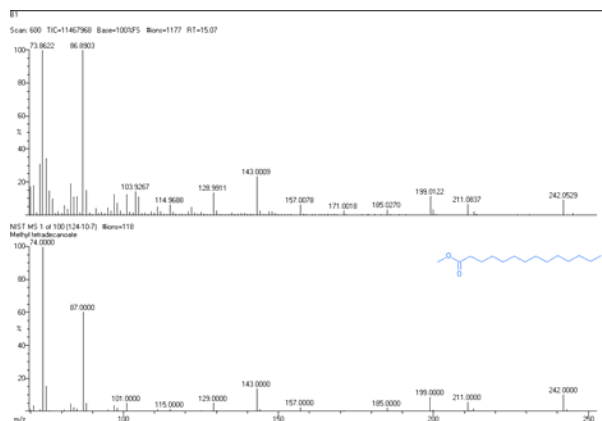


Fig 3: Mass spectrum of Methyl tetradecanoate.

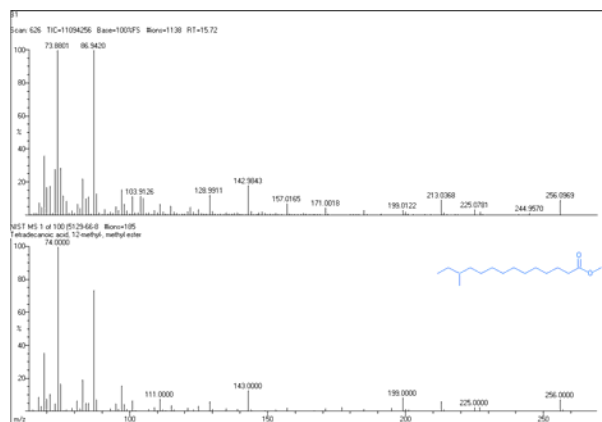


Fig 4: Mass spectrum of Tetradecanoic acid, 12-methyl-, methyl ester.

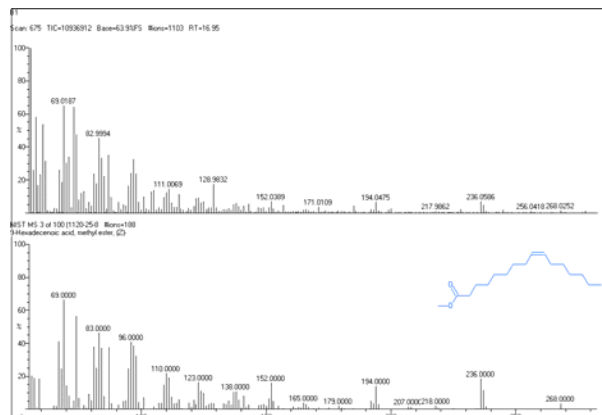


Fig 5: Mass spectrum of 9-Hexadecenoic acid, methyl ester.(Z)-.

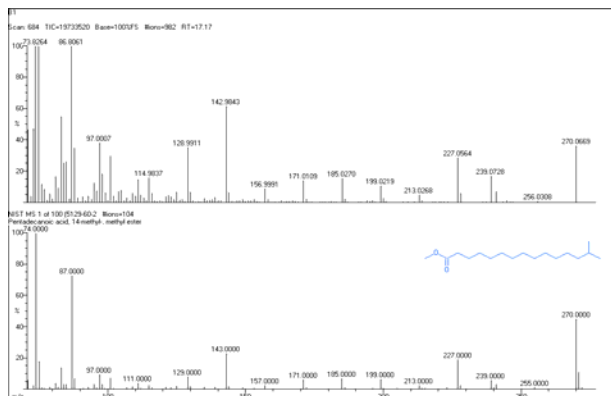


Fig 6: Mass spectrum of Pentadecanoic acid, 14-methyl-, methyl ester.

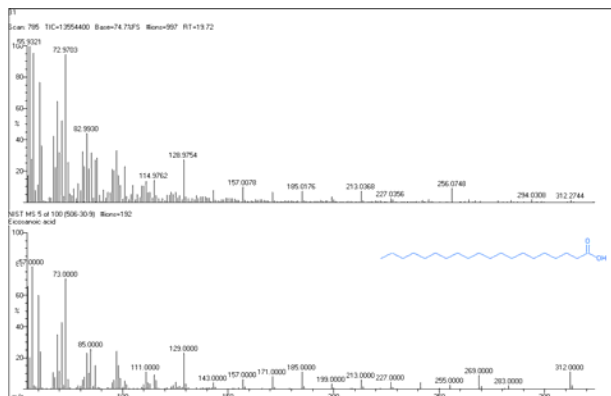


Fig 10: Mass spectrum of Eicosanoic acid.

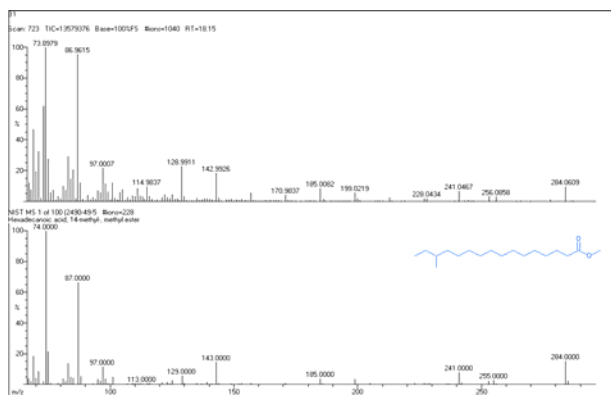


Fig 7: Mass spectrum of Hexadecanoic acid, 14-methyl-, methyl ester

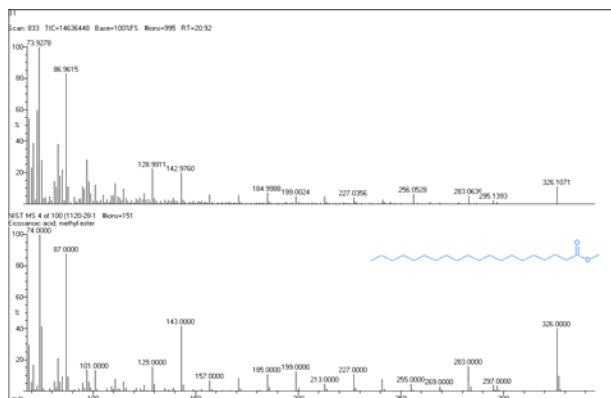


Fig 11: Mass spectrum of Eicosanoic acid, methyl ester

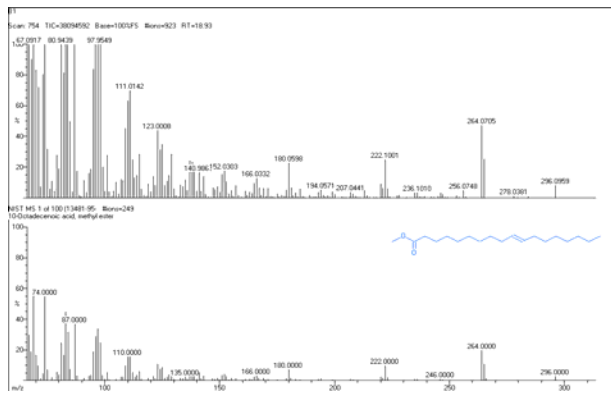


Fig 8: Mass spectrum of 10-Octadecenoic acid, methyl ester.

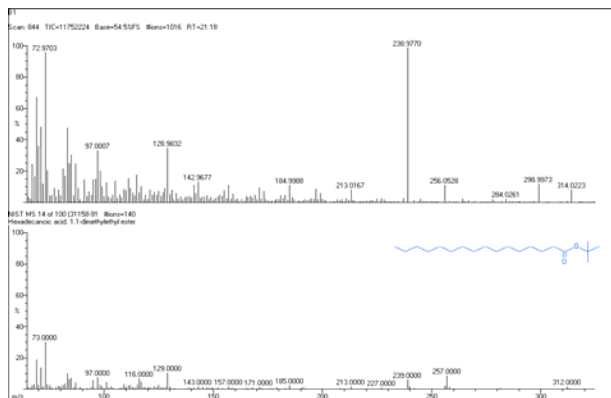


Fig 12. Mass spectrum of Hexadecanoic acid, 1,1-dimethylethyl ester.

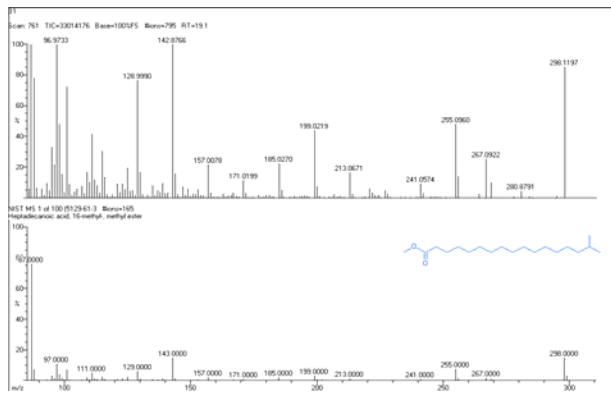


Fig 9: Mass spectrum of Heptadecanoic acid, 16-methyl, methyl ester.

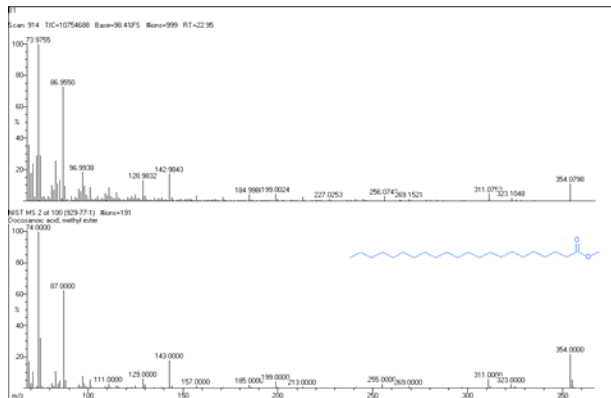


Fig 13: Mass spectrum of Docosanoic acid, methyl ester.

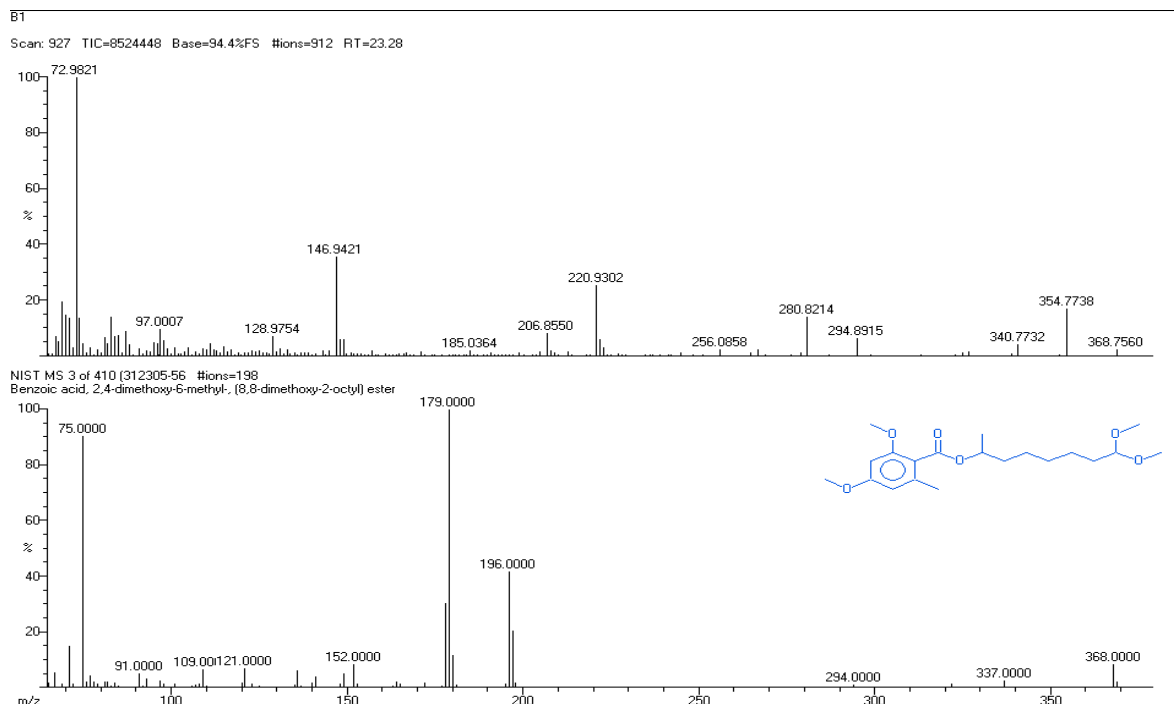


Fig 14: Mass spectrum of Benzoic acid, 2,4-dimethoxy-6-methyl-, (8,8-dimethoxy-2-octyl) ester.

Thirteen phyto components appearance in the n-hexane extract of *Indoneesiella echioides* (L) Nees leaves are listed in table 2.

Table 2: Phytochemical components identified for n-hexane extract of *Indoneesiella echioides* (L) Nees (GC-MS Study).

S.N	RT	Name of the compound	Molecular Formula	Molecular Weight	Peak Area (%)	Compound Nature	Activity
1.	12.85	Undecanoic acid, 10-methyl-, methyl ester	C ₁₃ H ₂₆ O ₂	214.3443	87	-	No activity reported.
2.	15.07	Methyl tetradecanoate	C ₁₅ H ₃₀ O ₂	242.3975	100	Myristic acid ester	Antioxidant, Cancer-preventive, Hypercholesterolemic, Nematicide activities.
3.	15.72	Tetradecanoic acid, 12-methyl-, methyl ester	C ₁₆ H ₃₂ O ₂	256.4241	100	Fatty acid methyl ester	Not activity reported.
4.	16.95	9-Hexadecenoic acid, methyl ester, (Z)-	C ₁₇ H ₃₂ O ₂	268.4348	63.9	Fatty acid methyl ester	Not activity reported.
5.	17.17	Pentadecanoic acid, 14-methyl-, methyl ester	C ₁₇ H ₃₄ O ₂	270.4507	100	Palmitic acid methyl ester	Antioxidant, Antifungal, Antimicrobial activities.
6.	18.15	Hexadecanoic acid, 14-methyl-, methyl ester	C ₁₈ H ₃₆ O ₂	284.4772	100	-	Not activity reported.
7.	18.93	10-Octadecenoic acid, methyl ester	C ₁₉ H ₃₆ O ₂	296.4879	100	Fatty acid ester	Antioxidant, Antimicrobial activities.
8.	19.1	Heptadecanoic acid, 16-methyl-, methyl ester	C ₁₉ H ₃₈ O ₂	298.5038	100	Stearic acid	Used against skin cancer protein.
9.	19.72	Eicosanoic acid	C ₂₀ H ₄₀ O ₂	312.5304	74.7	Fatty acid	Not activity reported.
10.	20.92	Eicosanoic acid, methyl ester	C ₂₁ H ₄₂ O ₂	326.5570	100	Arachidic acid	Alpha-glucosidase inhibitors activity.
11.	21.18	Hexadecanoic acid, 1,1-dimethylethyl ester	C ₂₀ H ₄₀ O ₂	312.5304	54.5	-	Not activity reported.
12.	22.95	Docosanoic acid, methyl ester	C ₂₃ H ₄₆ O ₂	354.6101	98.4	Fatty acid	Therapeutic, Diagnostic activities.
13.	23.28	Benzoic acid, 2,4-dimethoxy-6-methyl-, (8,8-dimethoxy-2-octyl) ester	C ₂₀ H ₃₂ O ₆	368.46448	94.4	-	Not activity reported.

Source: Dr. Duke's Phytochemical and Ethnobotanical Databases

4. GC – MS spectrum of chloroform extract of *Indoneesiella echioides* (L) Nees leaves.

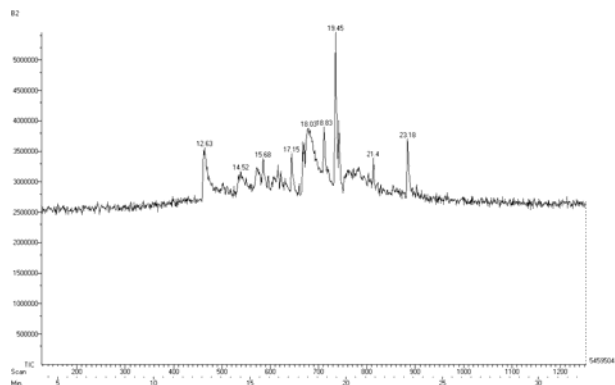


Fig 1: GC – MS with chloroform extract of *Indoneesiella echioides* (L) Nees plant leaves.

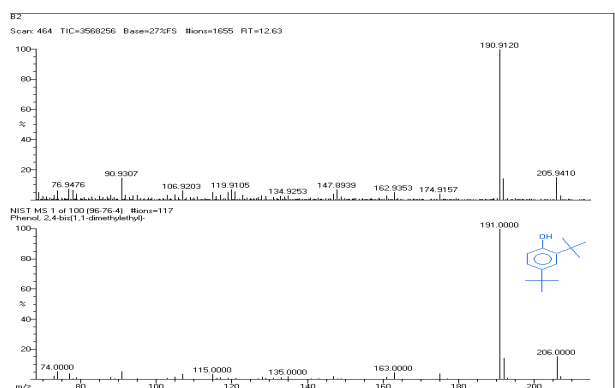


Fig 2: Mass spectrum of Phenol, 2,4-bis(1,1-dimethylethyl)-.

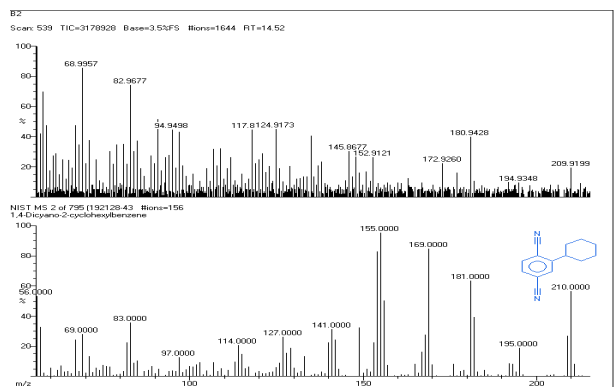


Fig 3: Mass spectrum of 1,4-Dicyano-2-cyclohexylbenzene.

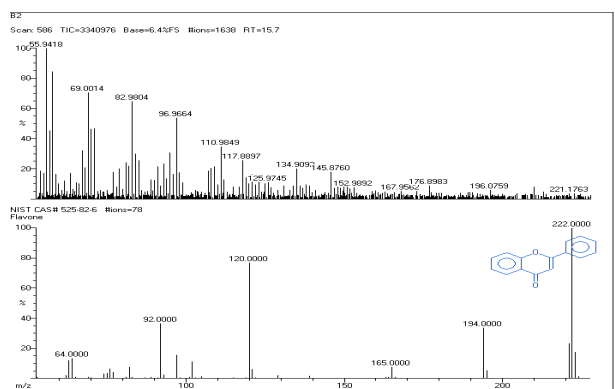


Fig 4: Mass spectrum of Flavone.

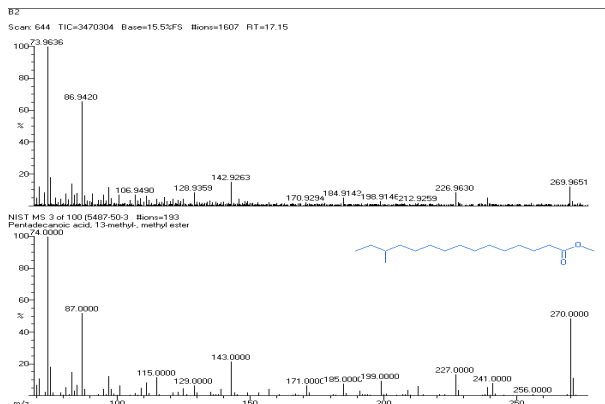


Fig 5: Mass spectrum of Pentadecanoic acid, 13-methyl-, methyl ester.

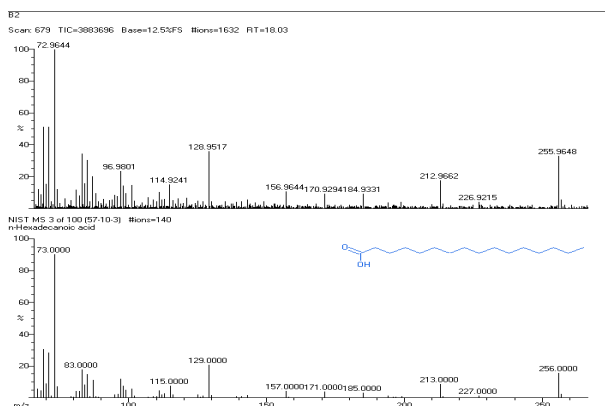


Fig 6: Mass spectrum of n-Hexadecanoic acid.

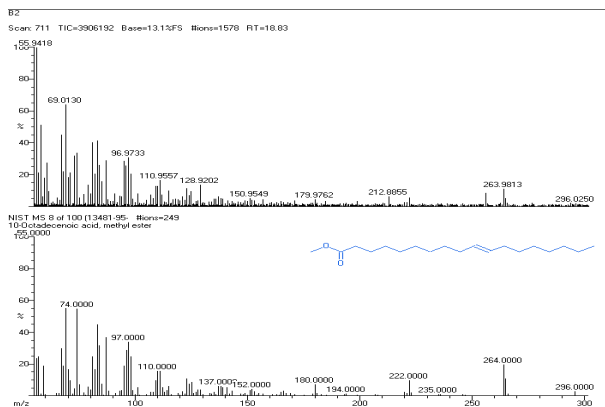


Fig 7: Mass spectrum of 10-Octadecenoic acid, methyl ester.

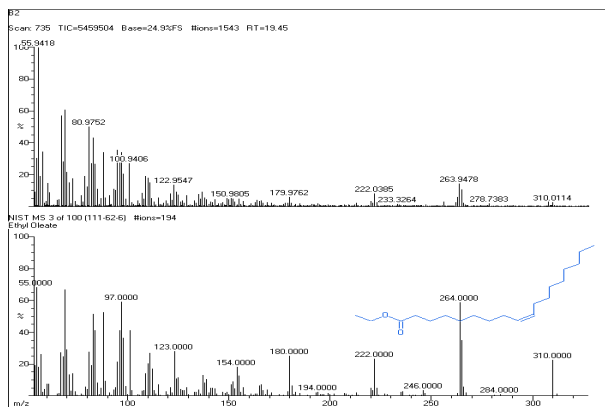


Fig 8: Mass spectrum of Ethyl Oleate.

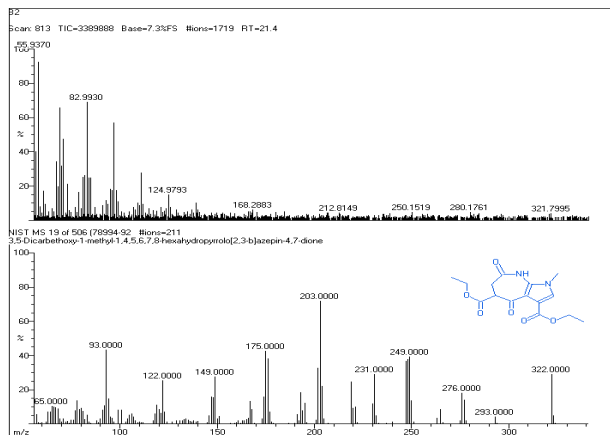


Fig 9: Mass spectrum of 3,5-Dicarbethoxy-1-methyl-1,4,5,6,7,8-hexahydropyrrolo(2,3-b)azepin-4,7-dione.

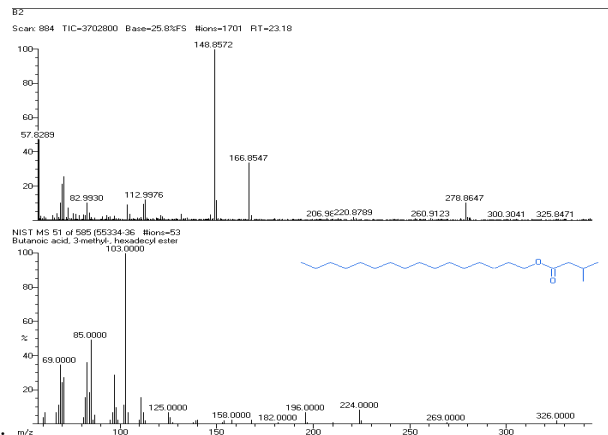


Fig 10: Mass spectrum of Butanoic acid, 3-methyl-, hexadecyl ester.

Nine phyto components appearance in the chloroform extract of *Indoneesiella echioides* (L) Nees leaves are listed in table 3.

Table 3: Phytochemical components identified for chloroform extract of *Indoneesiella echioides* (L) Nees (GC-MS Study).

S.N	RT	Name of the compound	Molecular Formula	Molecular Weight	Peak Area (%)	Compound Nature	Activity
1.	12.63	Phenol, 2,4-bis(1,1-dimethylethyl)-	C ₁₄ H ₂₂ O	206.3239	27	-	Antifungal, Antimicrobial, Antioxidant, Antimalarial activities.
2.	14.52	1,4-Dicyano-2-cyclohexylbenzene	C ₁₄ H ₁₄ N ₂	210.27436	3.5	-	-
3.	15.7	Flavone	C ₁₅ H ₁₀	222.239	6.4	-	-
4.	17.15	Pentadecanoic acid, 13-methyl-, methyl ester	C ₁₇ H ₃₄ O ₂	270.4507	15.5	-	-
5.	18.03	n-Hexadecanoic acid	C ₁₆ H ₃₂ O ₂	256.4241	12.5	Palmitic acid	Antioxidant, Hypocholesterolic, Nematicide, Pesticide, Lubricant, Antiandrogenic, Flavor, Hemolytic, 5-Alpha reductase inhibitor activities.
6.	18.83	10-Octadecenoic acid, methyl ester	C ₁₉ H ₃₆ O ₂	296.4879	13.1	Fatty acid ester	Antioxidant, Antimicrobial activities.
7.	19.45	Ethyl Oleate	C ₂₀ H ₃₈ O ₂	310.52	24.9	Fatty acid ethyl esters	It is used for vehicle for intramuscular drug delivery, Progesterone.
8.	21.4	3,5-Dicarbethoxy-1-methyl-1,4,5,6,7,8-hexahydropyrrolo(2,3-b)azepin-4,7-dione	-	-	7.3	Unknown compound	-
9.	23.18	Butanoic acid, 3-methyl-, hexadecyl ester.	-	-	25.8	Unknown compound	-

Source: Dr. Duke’s Phytochemical and Ethnobotanical Databases

5. GC – MS spectrum of acetone extract of *Indoneesiella echioides* (L) Nees leaves.

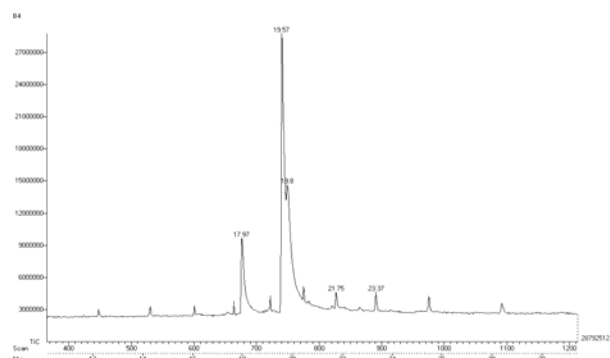


Fig 1: GC – MS with acetone extract of *Indoneesiella echioides* (L) Nees leaves.

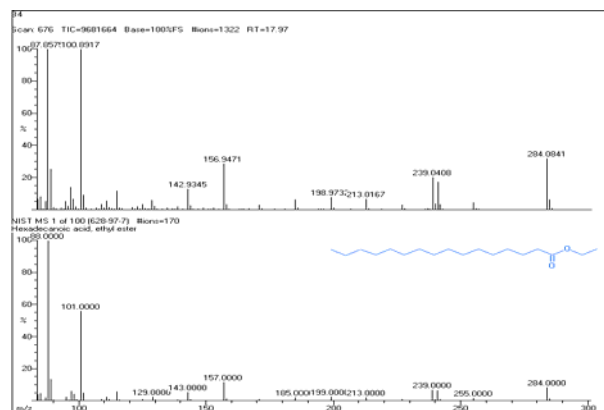


Fig 2: Mass spectrum of Hexadecanoic acid, ethyl ester.

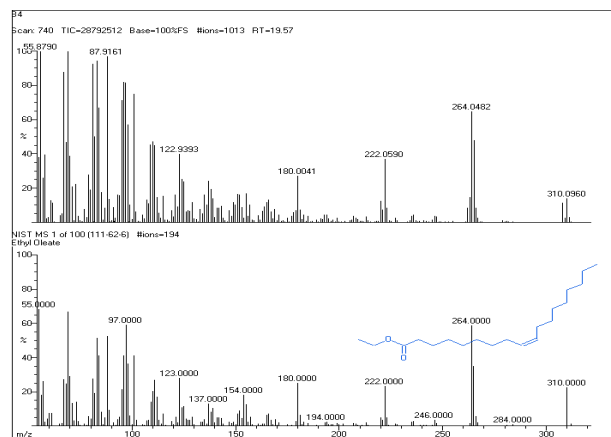


Fig 3: Mass spectrum of Ethyl Oleate.

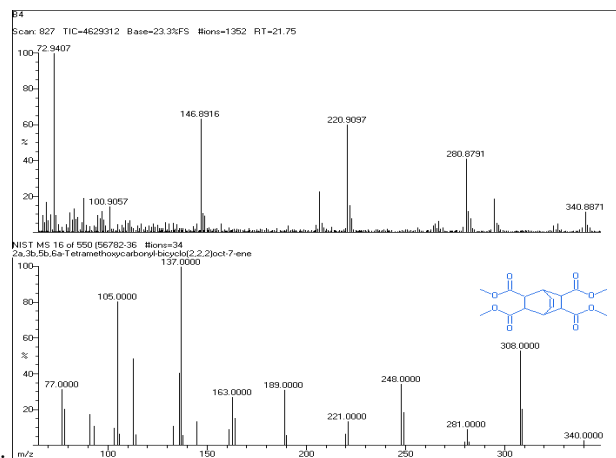


Fig 5: Mass spectrum of 2a, 3b, 5b, 6a-Tetramethoxycarbonyl-bicyclo(2,2,2)oct-7-ene.

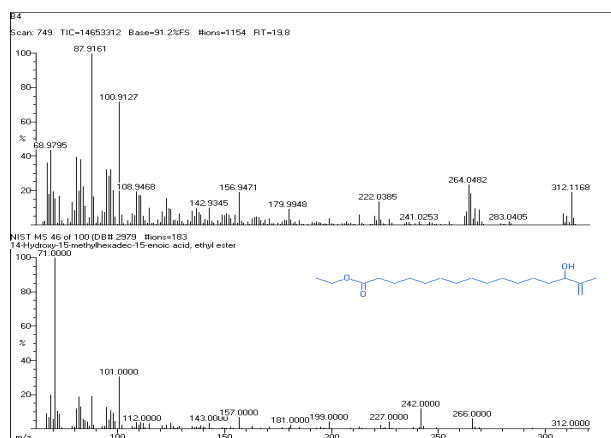


Fig 4: Mass spectrum of 14-Hydroxy-15-methylhexadec-15-enoic acid, ethyl ester.

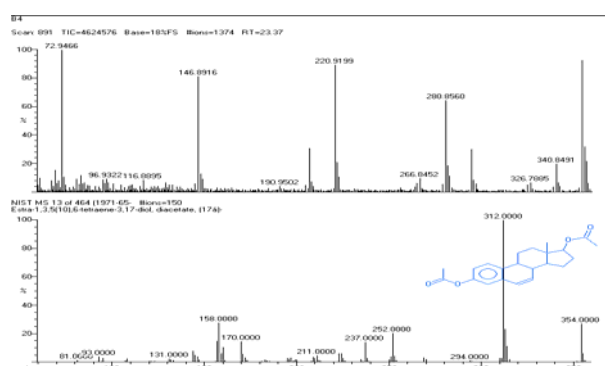


Fig 6: Mass spectrum of Estra-1, 3, 5 (10), 6-tetraene-3,17-diol,diacetate,(17a)-.

Five phyto components appearance in the acetone extract of *Indoneesiella echioides* (L) Nees plant leaves are listed in table 4.

Table 4: Phytochemical components identified for acetone extract of *Indoneesiella echioides* (L) Nees (GC-MS Study).

S.N	RT	Name of the compound	Molecular Formula	Molecular Weight	Peak Area (%)	Compound Nature	Activity
1.	17.97	Hexadecanoic acid, ethyl ester	C ₁₈ H ₃₆ O ₂	284	100	Fatty acid	Antioxidant, Hypocholesterolemic, Nematicide, Pesticide, Lubricant, Antiandrogenic, Flavor activities.
2.	19.57	Ethyl Oleate	C ₂₀ H ₃₈ O ₂	310.52	100	Fatty acid ethyl ester	It is used for vehicle for intramuscular drug delivery, Progesterone.
3.	19.8	14-Hydroxy-15-methylhexadec-15-enoic acid, ethyl ester	C ₁₉ H ₃₆ O ₃	312.48734	91.2	-	Not activity reported.
4.	21.75	2a,3b,5b,6a-Tetramethoxycarbonyl-bicyclo(2,2,2)oct-7-ene	C ₁₆ H ₂₀	340.325	23.3	-	Not activity reported.
5.	23.37	Estra-1,3,5(10),6-tetraene-3,17-diol,diacetate,(17a)-	-	-	18	Unknown compound	-

Source: Dr. Duke's Phytochemical and Ethnobotanical Databases

6. GC – MS spectrum of ethanolic extract of *Indoneesiella echioides* (L) Nees leaves.

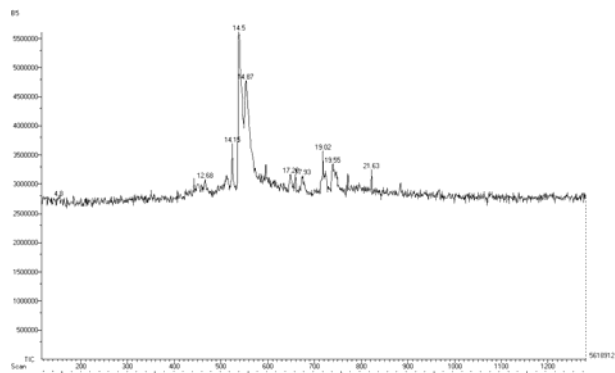


Fig 1: GC – MS with ethanolic extract of *Indoneesiella echioides* (L) Nees plant leaves.

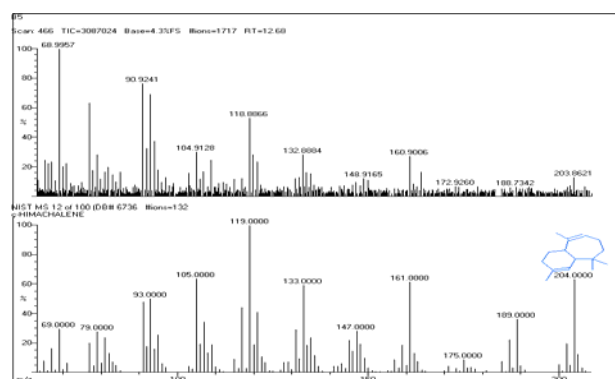


Fig 2: Mass spectrum of O-Himachalene.

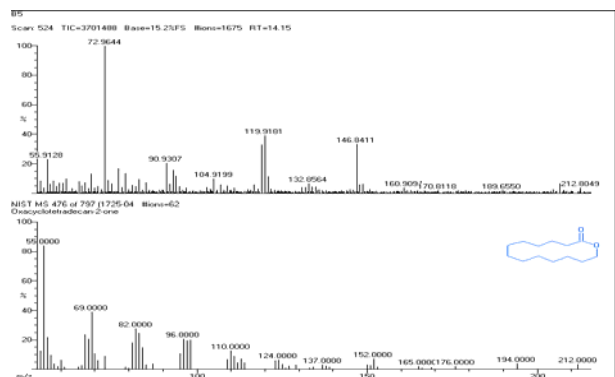


Fig 3: Mass spectrum of Oxacyclotetradecan-2-one.

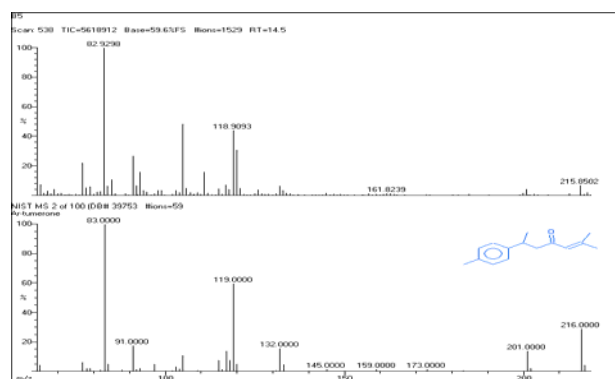


Fig 4: Mass spectrum of Ar-tumerone.

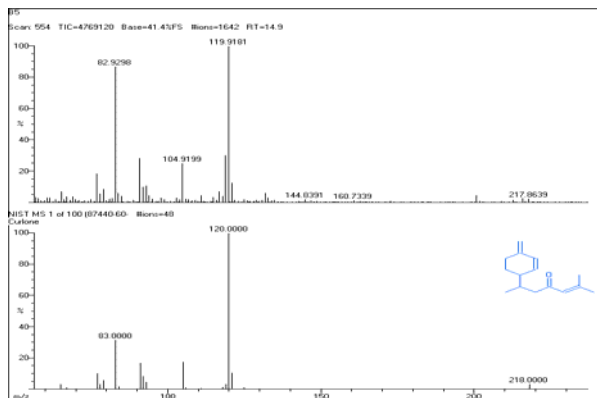


Fig 5: Mass spectrum of Curlone.

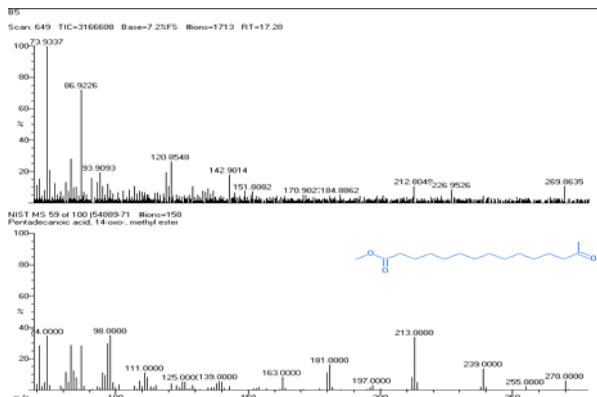


Fig 6: Mass spectrum of Pentadecanoic acid, 14-oxo-,methyl ester.

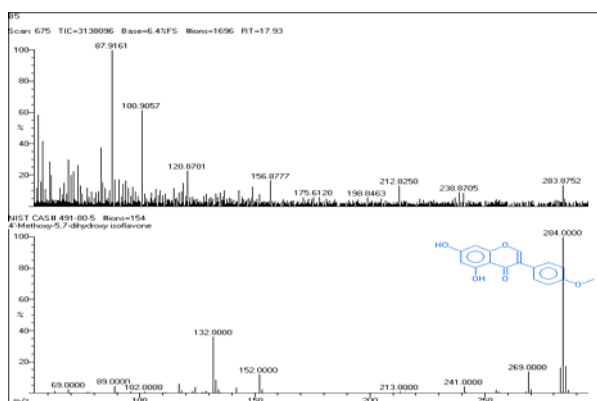


Fig 7: Mass spectrum of 4'-Methoxy-5,7-dihydroxy isoflavone.

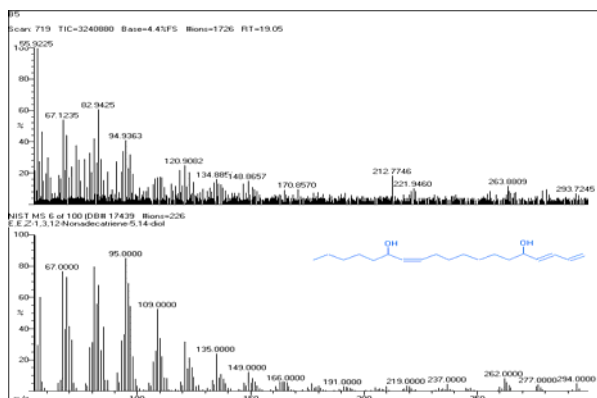


Fig 8: Mass spectrum of E,E,Z-1,3,12-Nonadecatriene-5,14-diol.

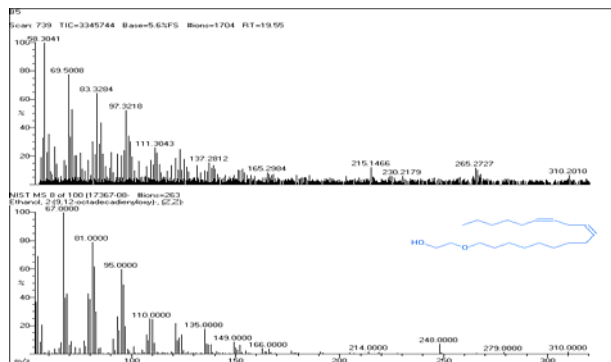


Fig 9: Mass spectrum of Ethanol,2-(9,12-octadecadienyloxy)-,(Z,Z)-.

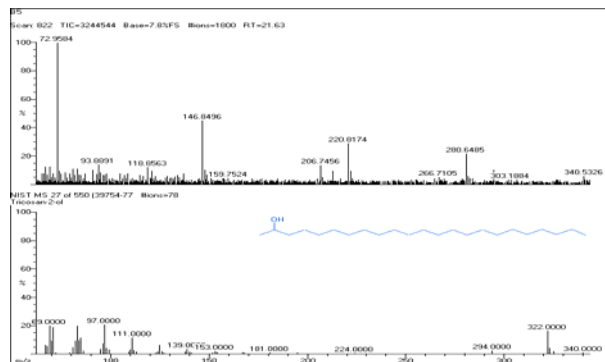


Fig 10: Mass spectrum of Tricosan-2-ol.

Nine phyto components appearance in the ethanolic extract of *Indonesiella echioides* (L) Nees leaves are listed in table 5.

Table 5: Phytochemical components identified for ethanolic extract of *Indonesiella echioides* (L) Nees (GC-MS Study).

S.N	RT	Name of the compound	Molecular Formula	Molecular Weight	Peak Area (%)	Compound Nature	Activity
1.	12.68	O-Himachalene	C ₁₅ H ₂₄	204.3511	4.3	-	Not activity reported.
2.	14.15	Oxacyclotetradecan-2-one	-	-	15.2	Unknown compound	-
3.	14.5	Ar-tumerone	C ₁₅ H ₂₀ O	216.319	91.8	Sesquiterpenoids	Antivenom. Antidépresseur, Anti-inflammatory, Neuroprotection activities.
4.	14.9	Curlone	C ₁₅ H ₂₂ O	218.33458	41.4	Ketone compound	Not activity reported.
5.	17.28	Pentadecanoic acid, 14-oxo-,methyl ester	C ₁₆ H ₃₀ O ₃	270.40800	7.2	-	Antioxidant, nematocid, pesticide, hypocholesterolemic activities.
6.	17.93	4'-Methoxy-5,7-dihydroxy isoflavone	C ₁₆ H ₁₂ O ₅	284.2635	6.4	Phyto estrogen compound	Used as a pharmaceutical intermediates.
7.	19.05	E,E,Z-1,3,12-Nonadecatriene-5,14-diol	C ₁₉ H ₃₄ O ₂	294	4.4	-	Antimicrobial activity.
8.	19.55	Ethanol,2-(9,12-octadecadienyloxy)-,(Z,Z)-	C ₂₀ H ₃₈ O ₂	310	5.6	Alcoholic compound.	Antimicrobial activity.
9.	21.63	Tricosan-2-ol	-	-	7.8	Unknown compound	-

Source: Dr. Duke’s Phytochemical and Ethnobotanical Databases

7. GC – MS Spectrum of butanol extract of *Indonesiella echioides* (L) Nees leaves.

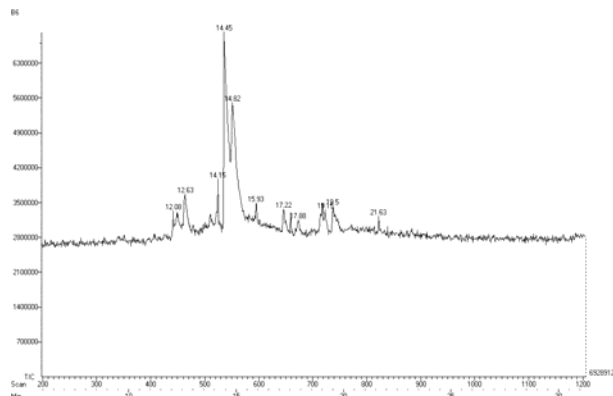


Fig 1: GC – MS with butanol extract of *Indonesiella echioides* (L) Nees plant leaves.

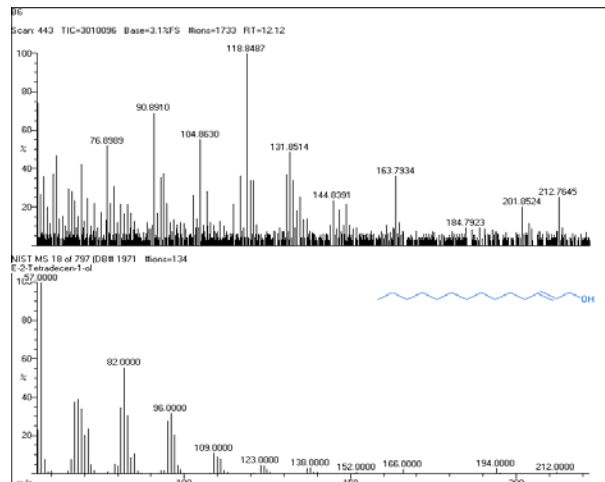


Fig 2: Mass spectrum of E-2-Tetradecen-1-ol.

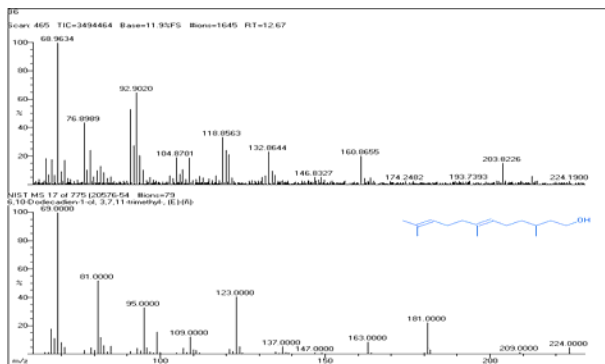


Fig 3: Mass spectrum of 6, 10-Dodecadien-1-ol,3,7,11-trimethyl-(E)-n-.

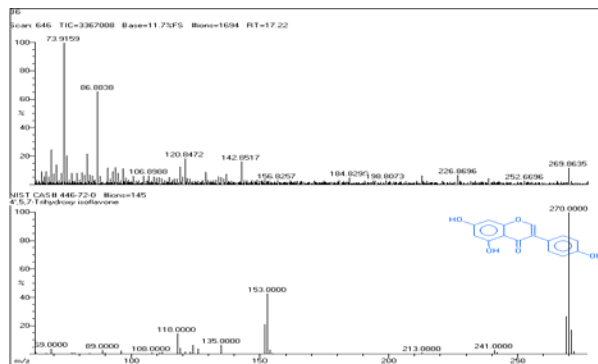


Fig 7: Mass spectrum of 4',5,7-Trihydroxy isoflavone.

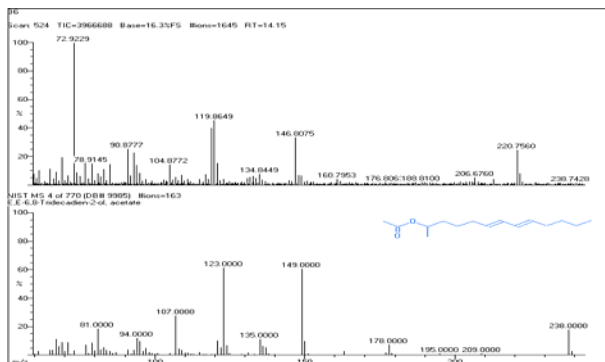


Fig 4: Mass spectrum of E, E-6,8-Tridecadien-2-ol, acetate.

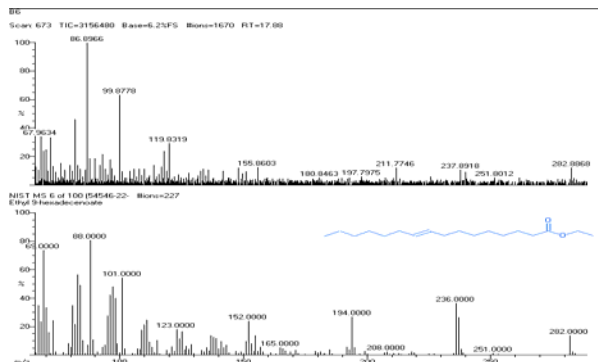


Fig 8: Mass spectrum of Ethyl 9-hexadecenoate.

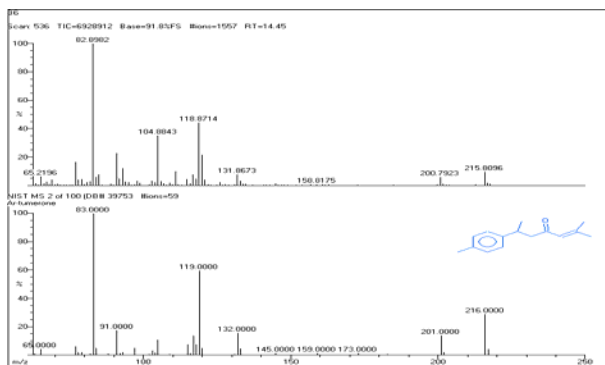


Fig 5: Mass spectrum of Ar-tumerone

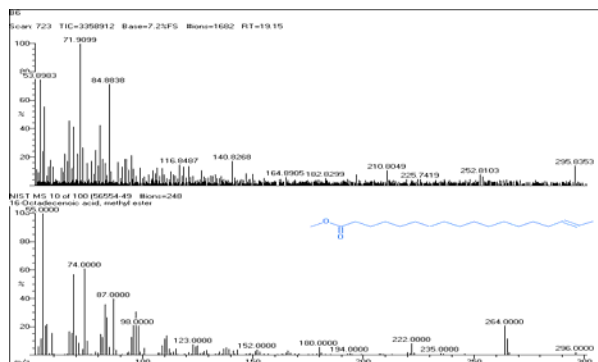


Fig 9: Mass spectrum of 16-Octadecenoic acid, methyl ester.

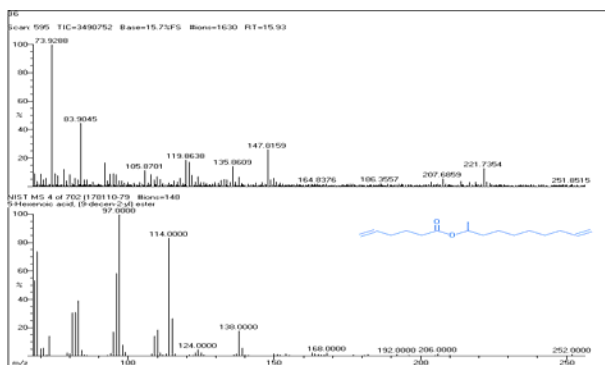


Fig 6: Mass spectrum of 5-Hexenoic acid,(9-decen-2-yl) ester.

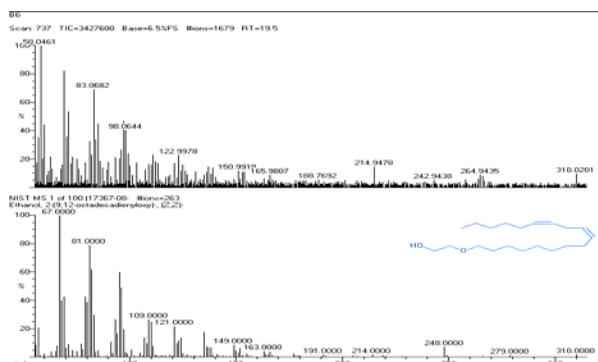


Fig 10: Mass spectrum of Ethanol, 2-(9, 12-octadecadienyloxy), (Z,Z)-.

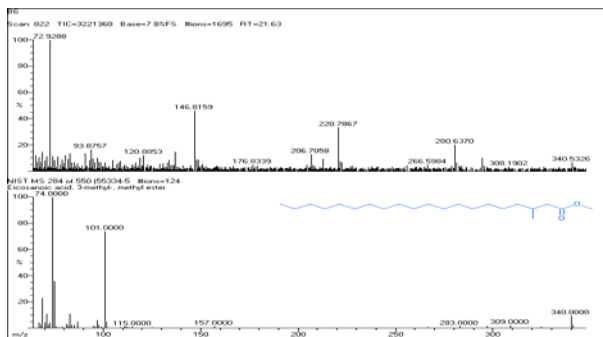


Fig 11: Mass spectrum of Eicosanoic acid, 3-methyl-, methyl ester

Ten phyto components appearance in the butanol extract of *Indonesiella echioides* (L) Nees leaves are listed in table 6.

Table 6: Phytochemical components identified for butanol extract of *Indonesiella echioides* (L) Nees (GC-MS Study).

S.N	RT	Name of the compound	Molecular Formula	Molecular Weight (g/mole)	Peak Area (%)	Compound Nature	Activity
1.	12.12	E-2-Tetradecen-1-ol	C ₁₄ H ₂₈ O	212.3715	3.1	Unsaturated alcoholic compound	No activity reported.
2.	12.67	6,10-Dodecadien-1-ol,3,7,11-trimethyl-,(E)-(n)-	C ₁₅ H ₂₈ O	224.38222	11.9	-	No activity reported.
3.	14.15	E,E-6,8-Tridecadien-2-ol, acetate	-	-	16.3	Unknown compound	-
4.	14.45	Ar-tumerone	C ₁₅ H ₂₀ O	216.319	91.8	Sesquiterpenoids	Antivenom. Antidépresseur Anti-inflammatory and Neuroprotective activities.
5.	15.93	5-Hexenoic acid,(9-decen-2-yl) ester	-	-	15.7	Unknown compound	-
6.	17.22	4',5,7-Trihydroxy isoflavone	C ₁₅ H ₁₀ O ₅	270.2369	11.7	-	Antitumor agent, antioxidant, antiangiogenic and immunosuppression- ssive activities.
7.	17.88	Ethyl 9-hexadecenoate	C ₁₈ H ₃₄ O ₂	282.4614	6.2	Fatty acid ester	No activity reported.
8.	19.15	16-Octadecenoic acid, methyl ester	C ₁₉ H ₃₆ O ₂	296.49	7.2	-	Selectively inhibit eukaryotic DNA polymerase activities <i>in vitro</i> (Yoshiyuki <i>et al.</i> , 1996).
9.	19.5	Ethanol, 2-(9,12-octadecadienyloxy)-,(Z,Z)-	C ₂₀ H ₃₈ O ₂	310	6.5	Alcoholic compound	Antimicrobial activity.
10	21.63	Eicosanoic acid, 3-methyl-, methyl ester	-	-	7.8	Unknown compound	-

Source: Dr. Duke's Phytochemical and Ethnobotanical Databases

8. GC – MS spectrum of methanolic extract of *Indonesiella echioides* (L) Nees leaves.

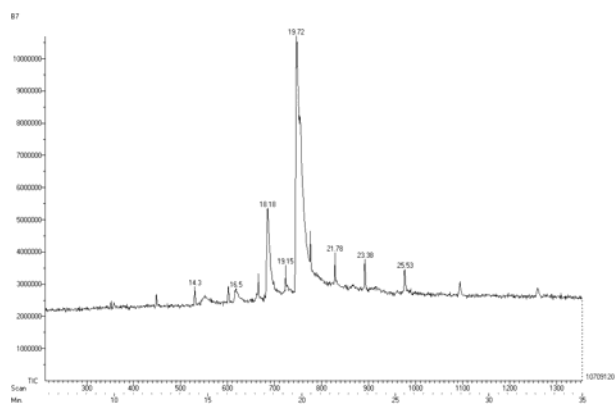


Fig 1: GC – MS with methanolic extract of *Indonesiella echioides* (L) Nees plant leaves.

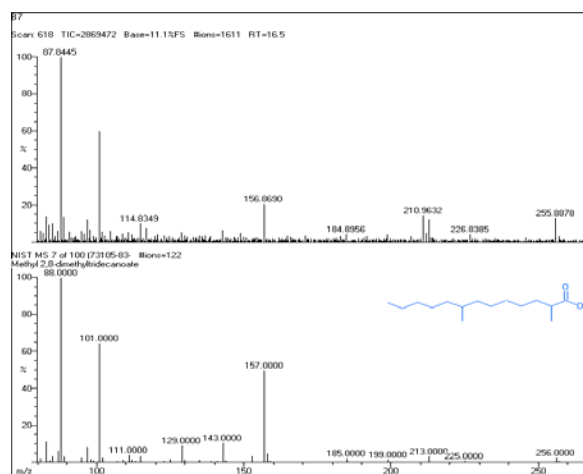


Fig 2: Mass spectrum of Methyl 2, 8-dimethyltridecanoate.

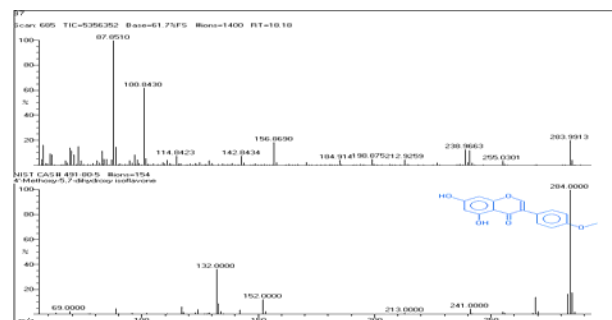


Fig 3: Mass spectrum of 4'-Methoxy-5,7-dihydroxy isoflavone.

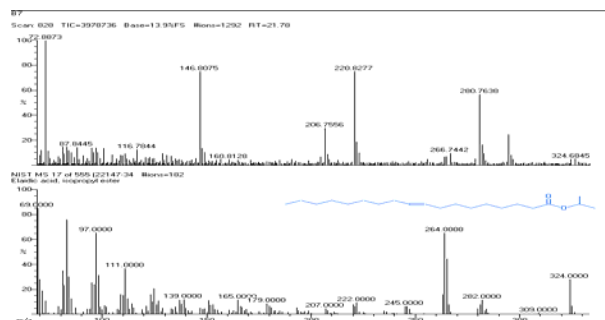


Fig 6: Mass spectrum of Elaidic acid, isopropyl ester.

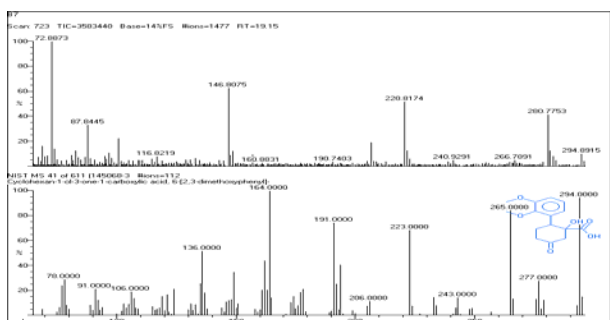


Fig 4: Mass spectrum of Cyclohexan-1-ol-3-one-1-carboxylic acid, 6-(2,3-dimethoxyphenyl)-.

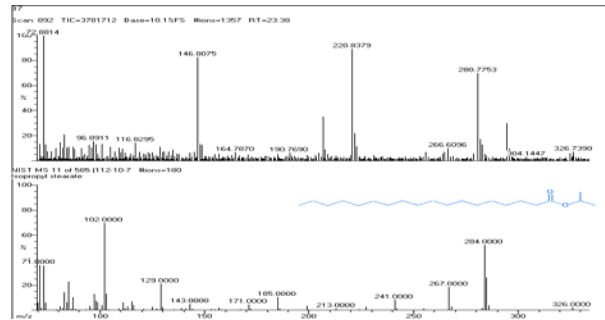


Fig 7: Mass spectrum of Isopropyl stearate.

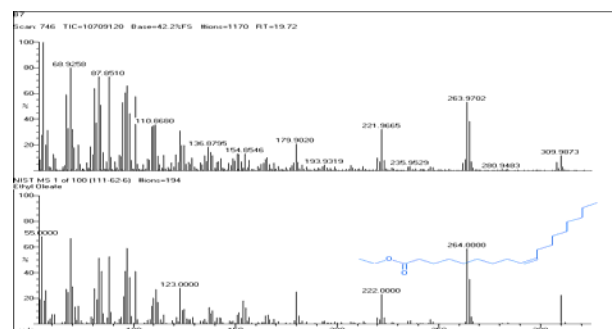


Fig 5: Mass spectrum of Ethyl Oleate.

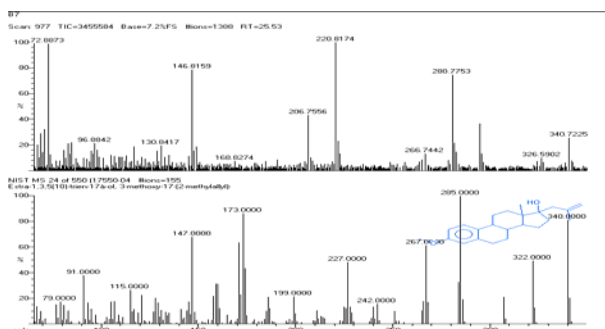


Fig 8: Mass spectrum of Estra-1,3,5(10)-trien-17a'-ol, 3-methoxy-17-(2-methylallyl)-.

Seven phyto components appearance in the methanolic extract of *Indoneesiella echioides* (L) Nees plant leaves are listed in table 7.

Table 7: Phytochemical components identified for methanolic extract of *Indoneesiella echioides* (L) Nees (GC-MS Study).

S.N	RT	Name of the compound	Molecular Formula	Molecular Weight	Peak Area (%)	Compound Nature	Activity
1.	16.5	Methyl 2,8-dimethyltridecanoate	C ₁₆ H ₃₂ O ₂	256.42408	11.1	-	No activity reported.
2.	18.8	4'-Methoxy-5,7-dihydroxy isoflavone	-	-	61.7	Unknown compound	-
3.	19.15	Cyclohexan-1-ol-3-one-1-carboxylic acid, 6-(2,3-dimethoxyphenyl)-	-	-	14	Unknown compound	-
4.	19.72	Ethyl Oleate	C ₂₀ H ₃₈ O ₂	310.52	42.2	Fatty acid ethyl esters	It is used for vehicle for intramuscular drug delivery, Progesterone.
5.	21.78	Elaidic acid, isopropyl ester	C ₂₁ H ₄₀ O ₂	324.541	13.9	-	Anti-inflammatory, hypocholesterolemic, cancer preventive, hepatoprotective anticoronary, antieczemic, insectifuge activities.
6.	23.38	Isopropyl stearate	C ₂₁ H ₄₂ O ₂	326.568	10.1	Stearic acid	An emollient, skin conditioning agent, binder and humectant activities.
7.	25.53	Estra-1,3,5(10)-trien-17a'-ol, 3-methoxy-17-(2-methylallyl)-	-	-	7.2	Unknown compound	-

Source: Dr. Duke's Phytochemical and Ethnobotanical Databases

9. Result and Discussion

De-Yang Shen *et al.* [20], reported that the new compounds of androgechosome A (5,8,2'-trihydroxy-7-methoxyflavone-5-*O*- β -D-glucopyranoside), androgechosome B (2*R*)-5,2'-dihydroxy-7-methoxyflavanone-5-*O*- β -D-glucopyranoside, androechioside A (2-*O*- β -D-glucopyranosyl-4-methoxy-2,4,6-trihydroxybenzoate), androechioside B (methyl 3-(2-hydroxyphenyl)-3-oxopropanoate 2-*O*- β -D-glucopyranoside) are isolated and structurally elucidated by spectral analysis and chemical transformation and 37 known compounds were identified to be, 2',6'-dihydroxyacetophenone 2'-*O*- β -D-glucopyranoside, echioidinin 5-*O*- β -D-glucopyranoside, echioidinin, pinostrobin, andrographidine C, dihydroechioidinin, tectochrysin 5-glucoside, methyl salicylate glucoside, 7,8-dimethoxy-5-hydroxyflavone, 5,7,8-trimethoxyflavone, skullcapflavone I 2'-methyl ether, acetophenone-2-*O*- β -D-glucopyranoside, androechin, skullcapflavone I 2'-*O*- β -D-glucopyranoside, tectochrysin, 5,7,2'-trimethoxyflavone, echioidin, skullcapflavone I, 5,7-dimethoxyflavone, negletein 6-*O*- β -D-glucopyranoside, andrographidine E, 4-hydroxy-3-methoxy-*trans*-cinnamic acid methyl ester, 4-hydroxybenzaldehyde, 4-hydroxy-*trans*-cinnamic acid methyl ester, *O*-coumaric acid, 2,6-dihydroxybenzoic acid, 132-hydroxy-(132-*R*)-phaeophytin, (*E*)-phytyl-epoxide, phytol, phytene 1,2-diol, (+)-dehydrovomifoliol, 3 β -hydroxy-5 α , 6 α ,-epoxy-7-megastigmen-9-one, β -sitosterol, β -sitosteryl-3-*O*- β -glucopyranoside, squalene, 1*H*-indole-3-carbaldehyde, and loliolide by comparison of their physical and spectral data with those reported in the literature.

In the present study preliminary phytochemical analysis of the *Indoneesiella echioides* (L) Nees revealed the presence of flavonoids, alkaloids, terpenoids, triterpenoids saponins, saponins, phenolic compound, sterols and amino acids are qualitatively analysed and the results are listed in table -1. These phytochemicals were found to be dihydroechioidinin, along with four unknown flavones, echioidinin, echioidin, skullcapflavone I 2'-*O*-methyl ester and skullcapflavone I 2'-*O*-glucoside [19]. GC-MS studies were reported that the Many phyto components such as flavones, sesquiterpenoids, fatty acid methyl ester, palmitic acid methyl ester, steroid, fatty acid ester, stearic acid, oleic acid, arachidic acid, myristic acid ester and unsaturated alcoholic compounds are appearance in the various extract of the *Indoneesiella echioides* (L) Nees leaves. The presences of phyto components are listed in the table -2, 3, 4, 5, 6 and 7.

10. Conclusion

The preliminary phytochemical analysis of *Indoneesiella echioides* (L) Nees leaves contains many bioactive chemicals like flavonoids, alkaloids, terpenoids, triterpenoids saponins, saponins, phenolic compounds, sterols and amino acids.

The GC-MS studies of *Indoneesiella echioides* (L) Nees leaves clearly indicate that the major compounds are the 4'-Methoxy-5,7-dihydroxy isoflavone (ethanol and methanol fractions), 4',5,7-Trihydroxy isoflavone (butanol fraction), Ar-tumerone (ethanol and butanol fractions), Ethyl Oleate (chloroform, acetone and methanol fractions), Ethanol, 2-(9,12-octadecadienyloxy)-,(*Z,Z*)- (ethanol and butanol fractions) are identified.

Unknown compounds such as 3,5-Dicarbethoxy-1-methyl-1,4,5,6,7,8-hexahydropyrrolo (2,3-*b*)azepin-4,7-dione, Butanoic acid, 3-methyl-, hexadecyl ester, Estra-1,3,5(10),6-tetraene-3,17-diol, diacetate, (17*a*')-, Tricosan-2-ol, E,E-6,8-

Tridecadien-2-ol, acetate, 5-Hexenoic acid, (9-decen-2-yl) ester, Eicosanoic acid, 3-methyl-, methyl ester, 4'-Methoxy-5,7-dihydroxy isoflavone, Cyclohexan-1-ol-3-one-1-carboxylic acid, 6-(2,3-dimethoxyphenyl)-, Estra-1,3,5(10)-trien-17*a*'-ol, 3-methoxy-17-(2-methylallyl)- are identified.

Minor compounds such as Undecanoic acid, 10-methyl-, methyl ester, Methyl tetradecanoate, Tetradecanoic acid, 12-methyl-, methyl ester, 9-Hexadecenoic acid, methyl ester, (*Z*)-, Pentadecanoic acid, 14-methyl-, methyl ester, Hexadecanoic acid, 14-methyl-, methyl ester, 10-Octadecenoic acid, methyl ester, Heptadecanoic acid, 16-methyl-, methyl ester, Eicosanoic acid, Eicosanoic acid, methyl ester, Hexadecanoic acid, 1,1-dimethylethyl ester, Docosanoic acid, methyl ester, Benzoic acid, 2,4-dimethoxy-6-methyl-, (8,8-dimethoxy-2-octyl) ester, Phenol, 2,4-bis(1,1-dimethylethyl)-, 1,4-Dicyano-2-cyclohexylbenzene, Flavone, Pentadecanoic acid, 13-methyl-, methyl ester, n-Hexadecanoic acid, 10-Octadecenoic acid, methyl ester, Ethyl Oleate, Hexadecanoic acid, ethyl ester, 14-Hydroxy-15-methylhexadec-15-enoic acid, ethyl ester, 2*a*,3*b*,5*b*,6*a*-Tetramethoxycarbonyl-bicyclo(2,2,2)oct-7-ene, O-Himachalene, Oxacyclotetradecan-2-one, Curlone, Pentadecanoic acid, 14-oxo-, methyl ester, E,E,*Z*-1,3,12-Nonadecatriene-5,14-diol, E-2-Tetradecen-1-ol, 6,10-Dodecadien-1-ol, 3,7,11-trimethyl-, (*E*)-(n)-, Ethyl 9-hexadecenoate, 16-Octadecenoic acid, methyl ester, Methyl 2,8-dimethyltridecanoate, Elaidic acid, isopropyl ester, Isopropyl stearate, 3-methoxy-17-(2-methylallyl)- also identified.

These compounds are contribute the activities like Antioxidant, Cancer-preventive, Hypercholesterolemic, Nematicide, Antifungal, Antimicrobial, Used against skin cancer protein, Alpha-glucosidase inhibitors, Therapeutic, Diagnostic, An emollient, skin conditioning agent, binder and humectant, Anti-inflammatory, hypocholesterolemic, cancer preventive, hepatoprotective, anticoronary, antieczemic, insectifuge, used for vehicle for intramuscular drug delivery, Progesterone, Selectively inhibit eukaryotic DNA polymerase activities, Antitumor agent, antioxidant, antiangiogenic and immunosuppressive, Antioxidant, nematicide, pesticide, hypocholesterolemic, Lubricant, Antiandrogenic, Flavor activities. Hence the plant leaves of *Indoneesiella echioides* (L) Nees is worthy for further investigation as used as a natural drugs developments.

11. Acknowledgement

I wish to express my deep sense of gratitude and most sincere thanks to Honourable Resource Person Dr. G. Chandramohan Principal, Jairams Arts and Science College, Karur-3, Tamilnadu, India for providing support to finish my research work.

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