PHYTO-CHEMICAL ANALYSIS OF CATHARANTHUS ROSEUS L BY GAS CHROMATOGRAPHY- MASS SPECTROMETERY STUDIES

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Abstract

The Bioactive Compounds of Cathantanthus Roseus. L have been analyze dusing Gas Chromatography - Mass Spectrometer (GC-MS). The Chemical compositions of the whole plant volatile compounds in Ethanol and water extracts of Cathantanthus Roseus.L of Rosea and Albawere analyzed through GC-MS. Majority of the compounds were belonging to ester and acid groups.1, 2-Benzene dicarboxylic acid diethyl ester was the higher percentage metabolite in Cathantanthus Roseus. L of Rosea and Alba. The bioactive compounds identified in the ethanolic extract of samples in both the varieties are Salicylic acid methyl ester, Salicylic acid ethyl ester, Myristic acid, Palmitic acid, Palmitic acid ethyl ester, Phytol, Linolenic acidmethy l ester, Linoleic acid ethyl ester, Linoleic acid and Linoleic acid ethyl ester. All these compounds are having antioxidant property with anti-inflammatory and anti cancer properties. The water extract analysis of plants showed the presence of Alkaloids in both the varieties which are very good antioxidants and anti-inflammatory compounds. Bioactive compounds are more in ethanolic extract of plants than in water extracts.

Keywords: Cathantanthus Roseus.L of Rosea and Alba, GC-MS Analysis, 1, 2-Benzenedicar boxylic acid diethyl ester.

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1. Introduction

Herbal medicinal plants are boon for human being as treatment of existing and new diseases are being developed either direct or indirect usage of plants. But availability of such plants and their properties also play an important role. Cathantanthus Roseus.L is a very important medicinal herb in this direction as availability and its property both are fortunate thing for humankind. This plant is used in treatment of several diseases like diabetes, cancer, high blood pressure, asthma, inflammation, dysentery, brain imbalance, angiogenesis, malaria and other diseases that occur due to potent micro organisms. Though it's a native of Madagascar but it is found most parts of the world.
Scientific Classification: [1]

Kingdom : Plantae
Division : Magnoliophyta (Flowering plants)
Class : Magnoliopsida (Dicotyledons)
Order : Gentianales
Family : Apocynaceae
Genus : Catharanthus
Species : C. roseus
Vernacular Names : [2]
English : Cayenne Jasmine, Old Maid, Periwinkle
Hindi : SadaSuhagan, Sadabahar
Kannada : Batlahoo, Bili kaasikanigalu, Ganeshanahoo,Kempukaasikanigalu
Malayalam : Banappuvu, Nityakalyani, Savanari, Usamalari
Marathi : Sadaphool, Sadaphul, Sadaphuli
Sanskrit : Nityakalyani, Rasna, Sadampuspa, Sadapushpi
Tamil : Cutkattumalli, Cutukattumalli, Cutukattuppu
Telugu : Billaganneru
Gujarati : Barmasi
Bengali : Nayantara

Fig.1 Cathantanthus Roseus.L of Rosea and Alba (Copied from google.com)

The name Catharanthus comes from the Greek for "pure flower" and roseus means red, rose, rosy. It is known as 'Sadabahar' meaning 'always in bloom' and is used for worship. These are perennial herbs (small shrub) with oppositely decussate or almost oppositely arranged leaves. Flowers are usually solitary in the leaf axils. Each has a calyx with five long, narrow lobes and a corolla with a tubular throat and five lobes. It grows to 20-80 cm height and blooms with pink, purple, or white flowers[3]. There are over 100 cultivars of Catharanthus Roseus known[4]. The main active constituents in plants are phenolic acids, flavonoids and alkaloids. These active substances perform a number of protective functions in the human organism and are involved in important anti-oxidative, anti-allergic, antibiotic, hypoglycaemic and anticarcinogen activities[5]. Catharanthus Roseus formely called as Vinca Rosea. There are two major cultivars of Catharanthus roseus L., which are distinguishable on the basis of their flower colors, namely "rosea" (Pink) and "alba" (White) are commonly found in India.

2. Materials and Methods

Collection of Plant Materials
Cathantanthus Roseus.L of Rosea and Albawas collected from the surrounding of Nagapattinam during August-December 2019.

Preparation of Extract

The collected plant leaves were washed with water. Washed leaves were dried at room temperature for 10-15 days in shaded place and grinded into coarsely powder. The coarse powder was subjected to successive extraction with ethanol and aqueous solvent. The extracts were collected. The collected extracts are subjected for further analysis. The active compounds were identified by Gas Chromatography-Mass Spectrometer.

Gas Chromatography - Mass Spectrometer Program:
The GC-MS analysis was carried out using a SHIMADZU-GCMS-QP-2010 plus (auto system XL) Gas chromatograph equipped and coupled to a mass detector SHIMADZU R ts-5 MS 5.1 spectrometer, column dimension was (30 meter × 0.50mm ID ×1μm) of capillary column. The instrument was set to on initial temperature of 120˚C and maintained at this temperature for 0-5 min for solvent delay. At the end of this period, the oven temperature was rose up to 270˚C at the rate of an increase of 5˚C/min. and the analysis completed in 30 min, Injection port temperature was ensured as 260˚C and Helium gas flow rate is fixed as 1ml/min. The ion source temperature in the instrument was fixed as 270 deg C.. The samples were injected in split mode in the ratio of 10:1. Mass spectral scan range was set at 45-450(m/z). The NIST library is used to identify the compounds present in the sample extract[6]. The mass spectrum of individual compound is matched with the mass spectrum of compounds in the sample

chromatogram showed as peaks and identified the nature of compounds.

3. Results and Discussion

The studies on the active compounds in the Cathantanthus Roseus.L of Rosea whole plant ethanol extract in by Gas Chromatography-Mass Spectrometer analysis clearly showed in Figure. 2

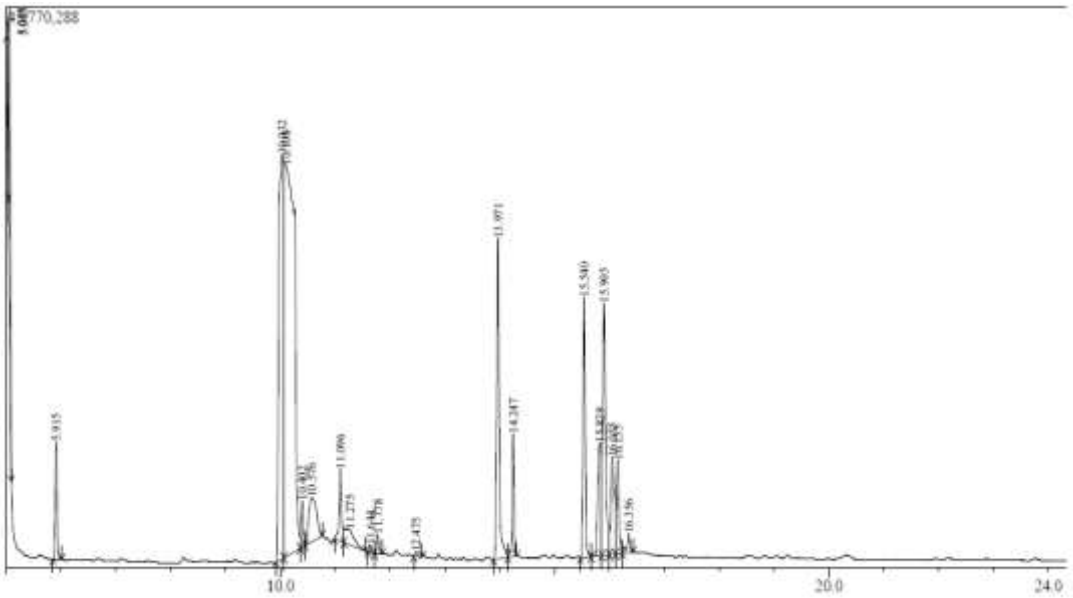

Fig.2.GC-MS Chromatogram of Ethanolic extract of Cathantanthus Roseus.L of Rosea

The presence of twenty compounds is tabulated in Table.1. The active compounds with their Retention Time (RT), Molecular Formula and Concentration are discussed below.

Table.1. Active Compounds in Ethanolic Extract of C.R. Rosea

No	RT	Name of the compound	Molecular Formula	Peak area %	Compound Nature	*Activity
1	5.025	Benzisoxazole	C_7H_5NO	1.35	Amino compound	Antimicrobial Anti-inflammatory
2	5.065	Benzoic acid, 2-hydroxy-, Methyl ester	$C8H_8O_3$	4.96	Salicylic acid methyl ester	Antimicrobial Anti-inflammatory Growth promoter
3	5.915	Benzoic acid, 2-hydroxy-, ethyl ester	$C_9\ H_{10}\ O_3$	1.89	Salicylic acid ethyl ester	Antimicrobial Anti-inflammatory Growth promoter
4	10.032	1,2-Benzenedicarboxylic acid, diethyl ester	$C_{12}\ H_{14}\ O_4$	18.01	Plasticizer compound	Antimicrobial Antifouling
5	10.108	Phthalic acid, allyl ethyl ester	$C_{13}\ H_{14}\ O_4$	35.23	Plasticizer compound	Antimicrobial Antifouling
6	10.402	1,4-Benzenedicarboxylic acid, 2-(acetyloxy)-dimethyl ester	$C_{12}\ H_{12}\ O_6$	0.83	Plasticizer compound	Antimicrobial Antifouling
7	10.576	alpha.-D-Glucopyranoside, methyl	$C_7\ H_{14}\ O_6$	3.17	Sugar moiety	Preservative
8	11.096	1,2-Benzenedicarboxylic acid, diethyl ester	$C_{12}\ H_{14}\ O_4$	1.67	Plasticizer compound	Antimicrobial Antifouling
9	11.275	Mome Inositol	$C_7H_{14}O_6$	1.32	Alcoholic compound	Antidiabetic
10	11.644	1,2-Benzenedicarboxylic acid, diethyl ester	$C_{12}\ H_{14}\ O_4$	0.13	Plasticizer compound	Antimicrobial Antifouling
11	11.778	Tetradecanoic acid	$C_{14}H_{28}O_2$	0.42	**Myristic acid**	Antimicrobial

						Anti-inflammatory Antioxidant Anticancer
12	12.475	2-Cycohexen-1-one, 4-Hydroxy-3,5,5	C_{13} H_{18} O_3	0.11	Ketone compound	No activity reported
13	13.971	Hexadecanoic acid	C_{16} H_{32} O_2	7.48	**Palmitic acid**	Antioxidant, Hypocholesterolemic Nematicide, Pesticide, Lubricant, Antiandrogenic, Flavor, Hemolytic 5-Alpha reductase inhibitor
14	14.247	Hexadecanoic acid, ethyl ester	C_{18} H_{36} O_2	2.09	**Palmitic acid ethyl ester**	Antioxidant, Hypocholesterolemic Nematicide, Pesticide, Lubricant, Antiandrogenic, Flavor, Hemolytic 5-Alpha reductase inhibitor
15	15.540	2-Hexadecen-1-ol, 3,7,11,15-tetramethyl-	C_{20} H_{40} O	4.90	**Phytol**	Antimicrobial Anti-inflammatory Antioxidant Anticancer
16	15.829	9-Octadecen-1-ol, (Z)-	C_{18} H_{36} O	3.69	Unsaturated alcoholic compound	Anti-inflammatory, Antiandrogenic Cancer preventive, Dermatitigenic Hypocholesterolemic, 5-Alpha reductase inhibitor, Anemiagenic Insectifuge,
17	15.905	9,12,15-Octadecatrienoic acid, methyl ester, (Z)	C_{19} H_{32} O_2	6.98	**Linolenic acid methyl ester**	Anti-inflammatory, Hypocholesterolemic Cancer preventive, Haepatoprotective, Nematicide Insectifuge, Antihistaminic Antieczemic, Antiacne, 5-Alpha reductase inhibitor Antiandrogenic, Antiarthritic, Anticoronary, Insectifuge
18	16.055	9,12-Octadecadienoic acid (Z,Z)-	C_{18} H_{32} O	3.11	Linoleic acid	Anti-inflammatory, Hypocholesterolemic Cancer preventive, Haepatoprotective, Nematicide Insectifuge, Antihistaminic Antieczemic, Antiacne, 5-Alpha reductase inhibitor Antiandrogenic, Antiarthritic, Anticoronary, Insectifuge
19	16.155	Ethyl Linoleolate	C_{20} H_{36} O_2	2.11	**Linoleic acid ethyl ester**	Anti-inflammatory, Hypocholesterolemic Cancer preventive, Haepatoprotective, Nematicide

						Insectifuge, Antihistaminic Antieczemic, Antiacne, 5-Alpha reductase inhibitor Antiandrogenic, Antiarthritic, Anticoronary, Insectifuge
20	16.356	Octadecanoic acid, ethyl ester	$C_{20}H_{40}O_2$	0.54	Stearic acid ethyl ester	No activity reported

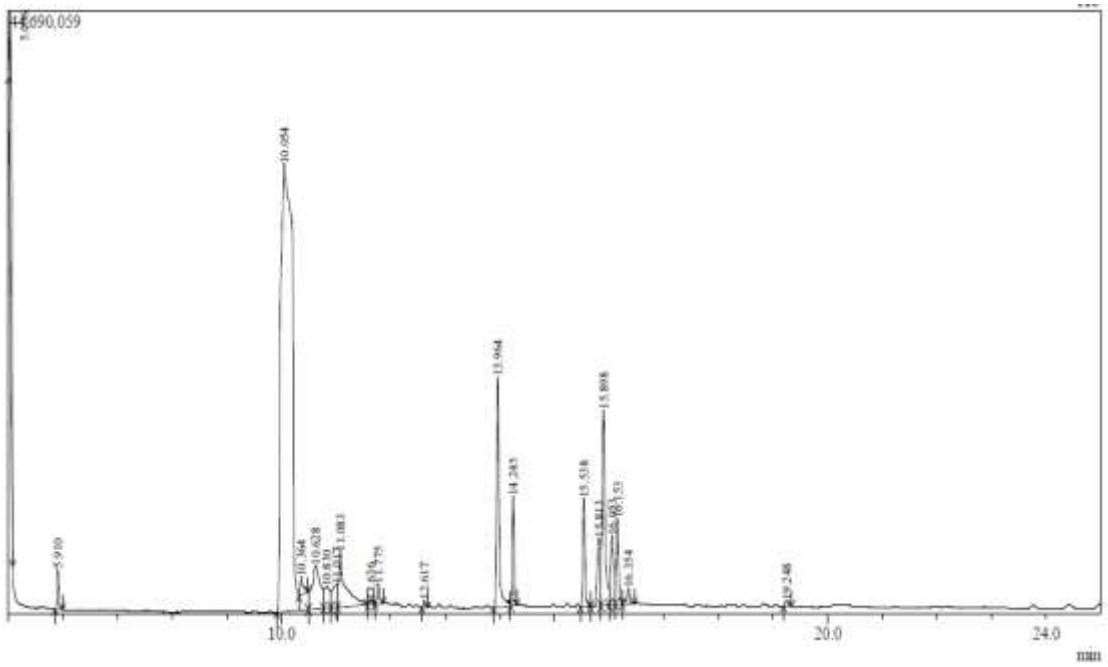

Fig.3. GC-MS Chromatogram of Ethanolic extract of Cathantanthus Roseus.L of Alba

Table.2. Active Compounds in Ethanolic Extract of C.R Alba

No	RT	Name of the compound	Molecular Formula	Peak area %	Compound Nature	*Activity
1	5.036	Benzoic acid, 2-hydroxy-, Methyl ester	$C_8H_8O_3$	6.58	Salicylic acid methyl ester	Antimicrobial Anti-inflammatory Growth promoter
2	5.910	Benzoic acid, 2-hydroxy-, ethyl ester	$C_9H_{10}O_3$	0.78	Salicylic acid ethyl ester	Antimicrobial Anti-inflammatory Growth promoter
3	10.054	1,2-Benzenedicarboxylic acid, diethyl ester	$C_{12}H_{14}O_4$	55.53	Plasticizer compound	Antimicrobial Antifouling
4	10.364	1,4-Benzenedicarboxylic acid, 2-(acetyloxy)-dimethyl ester	$C_{12}H_{12}O_6$	0.55	Plasticizer compound	Antimicrobial Antifouling
5	10.628	alpha.-D-Glucopyranoside, methyl	$C_7H_{14}O_6$	4.08	Sugar moiety	Preservative
6	10.830	alpha.-D-Glucopyranoside, .beta.-D-fructofuranosyl	$C_{12}H_{22}O_{11}$	1.35	Sugar moiety	Preservative
7	11.017	alpha.-D-Galactopyranoside, methyl	$C_7H_{14}O_6$	1.33	Sugar moiety`	Preservative
8	11.083	2,4-Imidazolidinedione, 1-[[(5-nitro-2-furanyl)methylene]amino]-	$C_8H_6N_4O_5$	3.97	Amino compound	Antimicrobial Anti-inflammatory
9	11.636	1,2-Benzenedicarboxylic acid, dipropyl ester	$C_{14}H_{18}O_4$	0.12	Plasticizer compound	Antimicrobial Antifouling
10	11.775	Tetradecanoic acid	$C_{14}H_{28}O_2$	0.52	Myristic acid	Antimicrobial

						Anti-inflammatory Antioxidant Anticancer
11	12.617	Neophytadiene	C_{20} H_{38}	0.15	Alkene compound	No activity reported
12	13.964	Hexadecanoic acid	C_{16} H_{32} O_2	6.13	Palmitic acid	Antioxidant, Hypocholesterolemic Nematicide, Pesticide, Lubricant, Antiandrogenic, Flavor, Hemolytic 5-Alpha reductase inhibitor
13	14.245	Hexadecanoic acid, ethyl ester	C_{18} H_{36} O_2	2.12	Palmitic acid ethyl ester	Antioxidant, Hypocholesterolemic Nematicide, Pesticide, Lubricant, Antiandrogenic, Flavor, Hemolytic 5-Alpha reductase inhibitor
14	15.538	2-Hexadecen-1-ol, 3,7,11,15-tetramethyl-,	C_{20} H_{40} O	2.48	Phytol	Antimicrobial Anti-inflammatory Anticancer Diuretic Antioxidant
15	15.813	Oxacycloheptadec-8-en-2-one	C_{16} H_{28} O_2	2.55	Ketone compound	No activity reported
16	15.898	9,12,15-Octadecatrienoic acid, methyl ester,	C_{19} H_{32} O2	6.29	**Linolenic acid methyl ester**	Anti-inflammatory, Hypocholesterolemic Cancer preventive, Haepatoprotective, Nematicide Insectifuge, Antihistaminic Antieczemic, Antiacne, 5-Alpha reductase inhibitor Antiandrogenic, Antiarthritic, Anticoronary, Insectifuge
17	16.053	9,12-Octadecadienoic acid (Z,Z)-	C_{18} H_{32} O	2.55	**Linoleic acid**	Anti-inflammatory, Hypocholesterolemic Cancer preventive, Haepatoprotective, Nematicide Insectifuge, Antihistaminic Antieczemic, Antiacne, 5-Alpha reductase inhibitor Antiandrogenic, Antiarthritic, Anticoronary, Insectifuge
18	16.153	Ethyl Linoleolate	C_{20} H_{36} O_2	2.17	**Linoleic acid ethyl ester**	Anti-inflammatory, Hypocholesterolemic Cancer preventive, Haepatoprotective, Nematicide Insectifuge, Antihistaminic

						Antieczemic, Antiacne, 5-Alpha reductase inhibitor Antiandrogenic, Antiarthritic, Anticoronary, Insectifuge
19	16.354	Octadecanoic acid, ethyl ester	$C_{20}H_{40}O_2$	0.56	Stearic acid ethyl ester	No activity reported
20	19.248	Hexadecanoic acid, ethyl ester	$C_{18}H_{36}O_2$	0.18	**Palmitic acid ethyl ester**	Antioxidant, Hypocholesterolemic Nematicide, Pesticide, Lubricant, Antiandrogenic, Flavor, Hemolytic 5-Alpha reductase inhibitor

The studies on the active compounds in the Cathantanthus Roseus.L of Rosea and Albawhole plant in the ethanolic extract by Gas Chromatograph-Mass Spectrometer analysis was showed in the Chromatogram in Fig.2 & 3. The Presence of twenty compounds was tabulated in Table.1 & 2 with Retention Time (RT), Molecular Formula and Peak area. The Common compounds identified with higher percentage are in the ethanolic extract of Cathantanthus Roseus.L of Rosea and Albaand referred to 1, 2-Benzene dicarboxylic acid diethyl ester. The bioactive compounds identified in the ethanolic extract of samples in both the varieties are Salicylic acid methyl ester, Salicylic acid ethyl ester,Myristic acid, Palmitic acid, Palmitic acid ethyl ester, Phytol, Linolenic acidmethyl ester, Linoleic acid ethyl ester, Linoleic acid and Linoleic acid ethyl ester. All these compounds are having antioxidant property with anti-inflammatory and anti cancer properties. 1, 2-Benzene dicarboxylic acid diethyl ester (Plasticizer Compound) has one of the major constituents and had a antimicrobial & antifouling activity. The rest of the compounds were minor constituents.

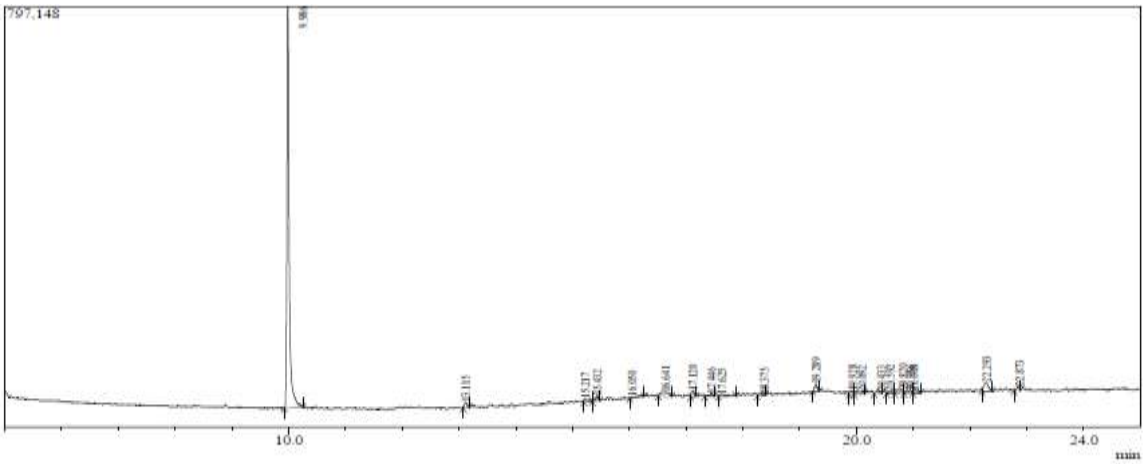

Fig.4.GC-MS Chromatogram of Aqueous extract of Cathantanthus Roseus.L of Rosea

The presence of twenty compounds is tabulated in table.1. The active compounds with their Retention Time (RT), Molecular Formula and Concentration are discussed below:

Table.3. Active Compounds in Aqueous Extract of C.R. Rosea

No	**RT**	**Name of the compound**	**Molecular Formula**	**Peak area %**	**Compound Nature**	***Activity**
1	9.986	1,2-Benzenedicarboxylic acid, diethyl ester	$C_{12}H_{14}O_4$	72.75	Plasticizer compound	Antimicrobial Antifouling
2	13.115	Butane, 1-chloro-3,3-dimethyl-	$C_6H_{13}Cl$	1.13	Chloro compound	Antimicrobial
3	15.217	Propanoic acid, 2-methyl-	$C_{12}H_{24}O_3$	1.05	Fatty acid compound	Antimicrobial Anti-inflammatory
4	15.432	1-(1'-cyclohenyl)-2-[(trimethylsilyl)methylidene]-4-	$C_{15}H_{26}O$ SI	1.28	Silica compound	No activity reported

		penten-1-ol				
5	16.050	Silanol, Tert-Butyldimethyl-	$C_6 H_{16} O SI$	0.94	Silica compound	No activity reported
6	16.641	2-Undecene, 3-methyl-, (Z)-	$C_{12} H_{24}$	2.82	Alkene compound	No activity reported
7	17.120	tert-butylmethyl ether	$C_5 H_{12} O$	1.58	Ether compound	No activity reported
8	17.446	ethyl 2-acetyl-6-cyclopropylidenehexanoate	$C_{13} H_{20} O_4$	0.90	Alkaloid compound	Antimicrobial Anti-inflammatory Antioxidant
9	17.625	1-Aziridineethanol	$C_4 H_9 N O$	1.39	Alcoholic compound	Antimicrobial
10	18.375	1,2,4,5-Tetrazine, 1,2,3,4-tetrahydro-3,6-dimethyl	$C_4 H_{10} N_4$	0.87	Azine compound	Antimicrobial Insecticide
11	19.289	3,3,5,5-Tetradeuteriomethoxycyclohexane	$C_7 H_{10} D_4 O$	1.79	Hexane compound	No activity reported
12	19.928	Dodecanal dimethyl acetal	$C_{14}H_{30}O_2$	0.86	Aldehyde compound	Antimicrobial Anti-inflammatory
13	20.092	3-tert-butyl-1,6-dimethyl-5-oxo-2,6-diazabicyclo[2.2.0]-hex-2-ene	$C_{10} H_{16} N_2 O$	1.49	Nitrogen compound	Antimicrobial
14	20.433	1,1-Dimethoxy pentadecane	$C_{17} H_{36} O_2$	1.18	Ether compound	No activity reported
15	20.592	(E)-1-(Tert-ButyLdimethyl silyl)-2-DE	$C_{21}H_{42}OSi$	1.45	Silica compound	No activity reported
16	20.820	Isoxazole, 3,5-dimethyl-	$C_5 H_7 N O$	1.87	Nitrogen compound	Antimicrobial
17	20.956	1,1-Dimethoxy-decane	$C_{12} H_{26} O_2$	1.09	Ether compound	No activity reported
18	21.008	Methyl ester of N-Carbobenzoxyleucyl-leucine	$C_{10} H_{17} D O_2$	1.04	Ester compound	No activity reported
19	22.293	1,3-Dioxolane, 2-propyl-	$C_6 H_{12} O_2$	3.01	Cyclic compound	No activity reported
20	22.873	1,1-dimethoxy dodecane	$C_{14}H_{30}O_2$	1.50	Ether compound	No activity reported

Fig.5. GC-MS Chromatogram of Aqueous extract of Cathantanthus Roseus.L of Alba

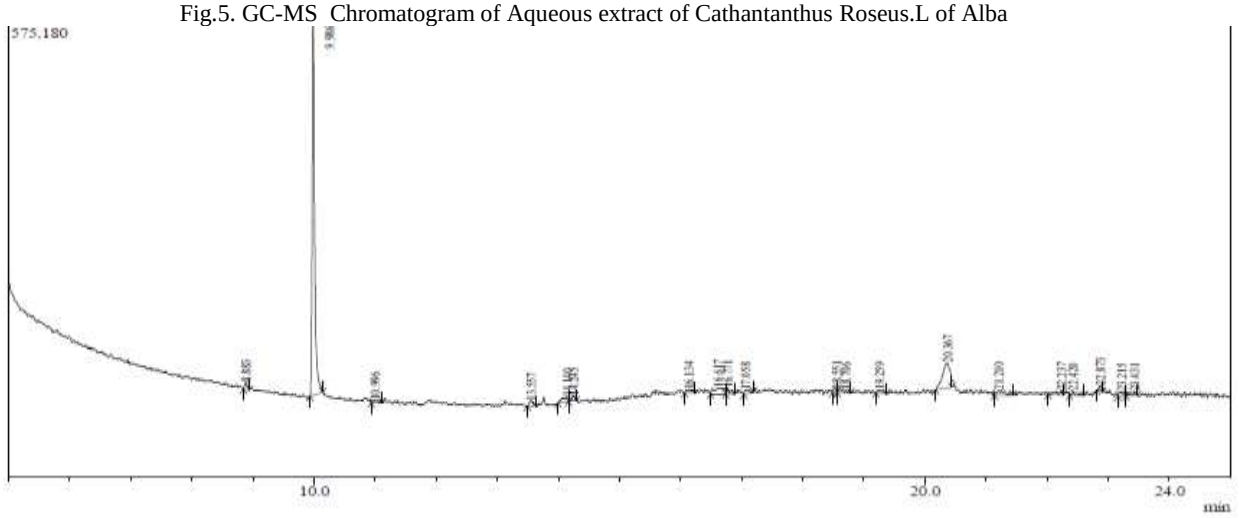

Table-4: Active Compounds in Aqueous Extract of C.R Alba

No	**RT**	**Name of the compound**	**Molecular Formula**	**Peak area %**	**Compound Nature**	***Activity**
1	8.883	Propanoic acid, 2-propenyl ester.	$C_6H_{10}O_2$	1.36	Ester compound	Antimicrobial
2	9.986	1,2-Benzenedicarboxylic acid, diethyl ester	$C_{12} H_{14} O_4$	59.19	Plasticizer compound	Antimicrobial Antifouling
3	10.996	Borane compound with carbon monoxide (1:1)	$C H_3 B O$	1.29	Boron compound	Plant growth promoter
4	13.557	Undecanoic acid, methyl ester	$C_{12} H_{24} O_2$	1.50	Fatty acid ester	No activity reported
5	14.140	1H-1,2,4-Triazole, 1-methyl-	$C_3 H_5 N_3$	1.84	Triazole compound	Fungicide Insecticide
6	14.245	Butanamide, N-cyclohexyl-	$C_{10} H_{19} N O$	1.07	Amide compound	Antimicrobial Anti-inflammatory
7	16.134	1-(Methylsulfonyl) Piperazine	$C_5H_{12}N_2O_2S$	1.46	Alkaloid	Antimicrobial

						Anti-inflammatory Antioxidant
8	16.617	Cyclopentane, 1,2-dimethyl-	C_7H_{14}	3.77	Cyclic compound	No activity reported
9	16.771	2(3H)-Furanone, dihydro-5-methyl-	$C_5\ H_8\ O_2$	1.32	Ketone compound	No activity reported
10	17.058	4-(Mesyloxy)-3,3-Dimethyl-2-Butanone	$C_7H_{14}O_4S$	1.40	Ketone compound	No activity reported
11	18.551	2H-Pyran-2-methanol, tetrahydro-	$C_6\ H_{12}\ O_2$	0.98	**Flavonoid fraction**	Antimicrobial Anti-inflammatory Antioxidant
12	18.706	Dodecane, 1,1'-oxybis-	$C_{24}\ H_{50}\ O$	1.64	Ether compound	No activity reported
13	19.259	Cyclopentanemethanol,	$C_9\ H_{17}\ N\ O_3$	1.17	Alcoholic compound	Antimicrobial
14	20.367	1,5-Heptadiene, 2,6-Dimethyl-	$C_9\ H_{16}$	12.31	Alkene compound	No activity reported
15	21.210	4H-1,2,4-Triazole, 4-ethyl-	$C_4\ H_7\ N_3$	2.41	Triazole compound	Fungicide Insecticide
16	22.237	Retronecanol	$C_8H_{15}NO$	1.85	Alkaloid	Antimicrobial Anti-inflammatory Antioxidant
17	22.420	4-Octen-3-one	$C_8H_{14}O$	1.54	Fragrance compound	Fragrance compound
18	22.873	2 Ethyl hexanol	$C_8H_{18}O$	1.13	Alcoholic compound	Antimicrobial
19	23.215	1,1-Dimethoxy-decane	$C_{12}\ H_{26}\ O_2$	1.43	Ether compound	No activity reported
20	23.431	2-Cyano-2-Ethylbutanamide.	$C_7H_{12}N_{2O}$	1.31	Amide compound	Antimicrobial Anti-inflammatory

The studies on the active compounds present in the aqueous extract of the Cathantanthus Roseus.L of Rosea and Alba whole plant by Gas Chromatograph-Mass Spectrometer analysis was clearly showed in the Chromatogram in Fig.4 & 5.

The Presence of twenty compounds was tabulated in Table.3 & 4 with Retention Time (RT), Molecular Formula and Peak area. The Common compounds identified in the aqueous extract of Cathantanthus Roseus.L of Rosea and Alba were 1,2-benzene dicarboxylic acid diethyl ester. In both the plant 1,2-benzene dicarboxylic acid diethyl ester (72.75% & 59.19%) has major constituent and Plasticizer compound in nature. Among twenty compounds half of the compounds have no activity reported. The rest of the compounds are minor constituents and have an activity. The water extract analysis of plants showed the presence of Alkaloids in both the varieties which are very good antioxidants and anti-inflammatory compounds.

4. Conclusion

In the present study, two different plants from Cathantanthus Roseus.L were studied for the presence of compounds in ethanol and aqueous extracts. The bioactive compounds identified in the ethanolic extract of samples in both the varieties are Salicylic acid methyl ester, Salicylic acid ethyl ester, Myristic acid, Palmitic acid, Palmitic acid ethyl ester, Phytol, Linolenic acidmethyl ester, Linoleic acid ethyl ester, Linoleic acid and Linoleic acid ethyl ester. All these compounds are having antioxidant property with anti-inflammatory and anti cancer properties. The water extract analysis of plants showed the presence of Alkaloids in both the varieties which are very good antioxidants and anti-inflammatory compounds. Bioactive compounds are more in ethanolic extract of plants than in water extracts. These compounds indicate their potential use for various diseases.

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