

PHYTOCHEMICAL SCREENING OF SELECTED INDOOR PLANTS FROM SWAT VALLEY USING GAS CHROMATOGRAPHY

Saima Quraishi

Center for Plant Sciences & Biodiversity University of Swat, 19120, KP, Pakistan

Zakia Ahmad*

Center for Plant Sciences & Biodiversity University of Swat, 19120, KP, Pakistan

Email: zakia@uswat.edu.pk

Naheed Fazal

Center for Plant Sciences & Biodiversity University of Swat, 19120, KP, Pakistan

Shazia Dilbar

Center for Plant Sciences & Biodiversity University of Swat, 19120, KP, Pakistan

Humaira bibi

Center for Plant Sciences & Biodiversity University of Swat, 19120, KP, Pakistan

Khadija bibi

Center for Plant Sciences & Biodiversity University of Swat, 19120, KP, Pakistan

Obaidullah Shah

Institute of Chemical Sciences, University of Swat, 19120, KP, Pakistan

Muhammad Jamil

Institute of Chemical Sciences, University of Swat, 19120, KP, Pakistan

ABSTRACT

A Phytochemical screening of selected 10 indoor plant's species including; *Dracaena trifasciata*, *Opuntia microdasys*, *Ravenea rivularis*, *Raphis excelsa*, *Ficus elastica*, *Dracaena fragrans*, *Epipremum aureum*, *Schefflera arboricola*, *Aucuba japonica*, *Syngonium podophyllum*, collected from local nurseries of Charbagh Swat was carried out from their dried leaves methanolic crude extracts using Gas Chromatography, GC-MS. The main compounds highlighted in **Epipremum aureum** were Oleic acid (33.25%), n-Hexadecanoic acid (10.81%), cis-13-Octadecenoic acid (9.73%), and Phytol (4.51%). The **Dracaena trifasciata** showed the high percentage of 9, 12-Octadecadienoic acid (Z, Z)-methyl ester (23.44%), Oleic acid (18.51%), and n-Hexadecanoic acid (7.69%). The **Rhapis excelsa** was contained Oleic acid (32.31%) and n-Hexadecanoic acid (14.45%). Similarly, **Ficus**

elastica was scored Fern-7-en-3 β -ol (15.75%), Lup-20(29)-en-3-one (9.58%), β -Sitosterol (7.42%), with additional compounds such as Oleic acid (8.48%) and Squalene (5.65%). The plant **Ravenea rivularis** was consisting of Scoparone (39.85%), Oleic acid (9.42%), and Phytol acetate (6.84%) in greater amount comparatively. **Schefflera arboricola** main constituents were 9-Octadecenoic acid (E) (14.52%) and n-Hexadecanoic acid (9.94%). The richest compounds in **Dracaena fragrans** were Oleic acid (23.77%) and n-Hexadecanoic acid (22.50%) with some amount of other important compounds like 2-Methyl-7-phenylindole (5.18% and Bis (2-ethylhexyl) phthalate (4.99%). In addition to this, **Aucuba japonica** was mainly composed of Oleic acid (16.56%) and n-Hexadecanoic acid (16.56%). The two most important compounds in **Syngonium podophyllum** were Phytol (21.41%) and Oleic acid (19.17%). The chemical constituents observed in **Opuntia microdasys** were, 1-Butanol, 4-butoxy- (52.91%), Oleic acid (3.27%) and n-Hexadecanoic acid (3.88%). The presence of such chemical compounds in the analyzed indoor plants is highly valued for their potential to improve human health, sustainability, and the environment.

Keywords: GC-MS; Indoor Plants; Phytochemical Screening; Environmental sustainability.

Introduction

In Pakistan, the field of indoor plant landscaping is expanding quickly. [1] It helps with the design and installation of live inside landscapes, primarily for homes, workplaces and entrance halls. [2] Indoor plants may make our houses and properties more aesthetically pleasant and functional for modern living. [3-5] In addition to increasing worker productivity, indoor plants improve Indoor Air Quality (IAQ) has become a growing concern because of the adverse consequences of enclosed air contamination on human health. [3, 6] Mostly people spend their 80-90% time of their daily lives in enclosed area that is why the poor IAQ is a crucial risk for human health. [7-9] Indoor air impurities like Carbon dioxide (CO₂), Volatile Organic Compounds (VOCs), and Particulate Matter (PM) can be dangerous for human health. [10-15]

Lengthen exposure to these pollutants can lead to terrible respiratory conditions, cardiovascular diseases, allergies, and other health problems, making it vitally important to find the solutions that reduce their harmful effects. [16-18] Accordingly, World Health Organization (WHO), for millions of early deaths yearly the poor indoor air quality is responsible, also contributing to the growing load of international health issues. [19, 20] The presence of indoor plants decreased dust pollution by up to 20% and lessened physical pain. [21] Additionally, they lower volatile organic compound concentrations. [22] We can overcome headaches, exhaustion, coughing, dry throats, and dry facial skin by employing indoor plants. [23] Also, indoor plants decrease CO₂ levels and increase humidity, contributing to a healthier and more agreeable indoor environments [24]

In Pakistan, the indoor plant industry is still in its infancy, and the general public is not very knowledgeable about indoor plants. In order to create novel medications to treat a variety of illnesses, pharmaceutical companies are especially interested in the

phytochemical study of plants, which is highly significant from a commercial standpoint. [25] The present study intends to examine the phytochemical analysis of a few chosen indoor decorative plants growing in nurseries of Swat valley due to their ease of cultural activities and low preferences in cultivation conditions. Gas Chromatography-Mass Spectrometry (GC-MS) is a useful logical method to recognize, measure, and follow the modification of VOCs and other chemicals in both air and plant tissues. This method allows researchers to identify even minute levels of impurities, providing a detailed knowledge about the plants interrelation with environment, and how take up and change dangerous substances. [26] The objective of this research is to inquire the presence of chemical constituents present in selected ten indoor plants using GC-MS technique to exploit the potential of Indoor plants.

Materials and methods

Plant material consist of ten indoor plants were chosen from nurseries and indoor spaces of Charbagh Swat valley. Plants were taxonomically identified by Dr. Zahid Ullah Associate Professor Center for Plant Sciences and Biodiversity University of Swat. The ten species were determined to be *Dracaena trifasciata*, *Opuntia microdasys*, *Ravenea rivularis*, *Raphis excelsa*, *Ficus elastica*, *Dracaena fragrans*, *Epipremum aureum*, *Schefflera arboricola*, *Aucuba japonica*, *Syngonium podophyllum*. After a thorough washing, the collected plant material was dried for approximately 20 days at 29 ± 2 °C in the shade. In a mixer grinder, the dried plant samples were thoroughly crushed into a fine powder. Following that, the powdered samples were kept at room temperature. [27, 28]

Plant extract Preparation

These plants were shade-dried and then we added 100 ml methanol with 50g powder of each plant to keep it in orbital shaker for a week until the methanol dissolved the powder and then they were filtered with the help of filter paper.

Phytochemical Analysis (GC-MS)

The plant samples were shade-dried and ground into a fine powder using an electric grinder. The natural constituents of each indoor plant sample were analyzed using a Thermo Scientific DSQ II gas chromatograph-mass spectrometer (GC-MS). Helium gas was used as the carrier with a flow rate set at 1mL/min. the injector was operated in split mode to maintain a temperature of 250°C. The samples were introduced into the system at an initial oven temperature of 50°C, with an injection volume of 1 µL. The temperature was held at 50°C for 2 minutes, after which it was increased at a rate of 150°C/min until reaching a final temperature of 150°C, where it was held for an additional 5 minutes.

Data Analysis

The data were subjected to mean $\pm$ using SPSS software (version 22) and Microsoft Excel 2016. One-way analysis of variance (ANOVA) was performed to assess significant differences among the propagation techniques. For more detailed statistical comparison, two-way ANOVA was applied using Graph Pad Prism 5 (version 5.01). Linear regression analysis was used to compute the values from the plant extract

samples at varying concentrations. The Pearson correlation coefficient of the plant extract sample at varying concentrations. The Pearson correlation coefficient of the plant extracts was calculated using Excel 2007.

Results and Discussion

Phytochemical Analysis (GC-MS)

A wide range of bioactive chemicals with potential uses in industry, agriculture, and medicines were recognized using the GC-MS analysis of methanol crude extracts from different plant species. The primary chemical compounds found in the leaves of different species were:

Epipremnum aureum (Money Plant)

The methanol crude isolated extract from leaves of *Epipremnum aureum* was evaluated through GC-MS to identify and characterized 22 distinct organic compounds, demonstrating the main chemical constituents in varying quantity (Table 1, figure 1) were Oleic acid (33.25%), n-Hexadecanoic acid (10.81%), cis-13-Octadecenoic acid (9.73%), and phytol (4.51%). The other notable compounds were 9-Octadecenoic acid (Z)-methyl ester (4.01%) and γ -Sitosterol (5.10%). This varied composition specifies the existence of compounds with potential antioxidant and anti-inflammatory properties (Table 1, Fig. 1).

Dracaena trifasciata (Snake Plant)

The main components of the 23 compounds that were found were n-hexadecanoic acid (7.69%), oleic acid (18.51%), and 9,12-Octadecadienoic acid (Z,Z)-methyl ester (23.44%). Other notable components were Stigmasterol (4.69%) and phytol (3.95%). The chemical outline points to the possibility of bioactive qualities in fields including anti-inflammatory and skin care products (Table 2, Fig. 2).

Rhapis excelsa (Lady Palm)

The methanol crude isolated extract from leaves of *Rhapis excelsa* was evaluated through GC-MS to identify and characterized 18 distinct organic compounds, demonstrating the main chemical constituents in varying quantity (Table 3, Fig. 3). The two major components were n-Hexadecanoic acid (14.45%) and Oleic acid (32.31%). Bis (2-ethylhexyl) phthalate (3.52%), methyl ester (E) (8.09%), and 9-Octadecenoic acid were further noteworthy chemicals. Compounds that have anti-inflammatory and antioxidant properties proposed by this composition

Ficus elastica (Rubber Plant)

The methanol crude isolated extract from leaves of *Ficus elastica* was evaluated through GC-MS to identify and characterized 30 distinct organic compounds, demonstrating the main chemical constituents in varying quantity (Table 4, Fig. 4). The chemicals were found in the analysis, with β -Sitosterol (7.42%), Lup-20(29)-en-3-one (9.58%), and Fern-7-en-3 β -ol (15.70%) bein the main substance. Other important substances were hexamethyl-Cyclotrisiloxane (5.33%), Oleic acid (8.48%), and Squalene (5.65%). The chemicals' varied outline illustrates *Ficus elastica*'s ability for use in the creation of industrial and medicinal applications.

Ravenea rivularis (Majesty palm)

17 chemicals were identified in the *Ravenea rivularis* leaf methanol crude extract. Scoparone (39.85%), oleic acid (9.42%), and phytol acetate (6.84%) were the main components. β -Sitosterol (5.12%) and 11-Octadecenoic acid, methyl ester (4.85%) were other noteworthy substances (Table 5, Fig. 5). Potential bioactive qualities are supposed by the chemical makeup, especially in the creation of natural resources for medicinal purposes.

Schefflera arboricola (Dwarf Umbrella Plant)

28 distinct chemicals were found in the analysis. 9-Octadecenoic acid (E) (14.52%), n-Hexadecanoic acid (9.94%), Oleic acid (6.93%), and Stigmasterol (7.49%) were among the main compounds. Caryophyllene (4.97%) and Caryophyllene oxide (2.89%) were other noteworthy chemicals (Table 6, Fig. 6). The diverse array of chemicals suggests encouraging bioactive abilities, especially for antibacterial and anti-inflammatory uses.

Dracaena fragrans (Corn Plant)

22 chemicals found in *Dracaena fragrans*, the most prevalent ones were n-Hexadecanoic acid (22.50%) and Oleic acid (23.77%). Bis(2-ethylhexyl) phthalate (4.99%) and 2-Methyl-7-phenylindole (5.18%) were two more noteworthy chemicals (Table 7, Fig.7). Potential uses in the creation of antioxidant and anti-inflammatory products are supposed by the mixture. Peterson et al., (2023) observed the removal efficiency of *Dracaena fragrans* compounds was based on the provision of diverse conditions.

Aucuba japonica (Spotted laurel)

The methanol crude isolated extract from leaves of *Aucuba japonica* was found to contain 20 various chemicals (Table 8, Fig. 8), with n-Hexadecanoic acid (16.56%) and Oleic acid (24.35%) being the main component. Thienol [2,3-b]pyridine-2-carboxamide, 3-amino-6-methyl- (4.89%) and dl-glyceraldehyde dimer (3.78%) were other noteworthy compounds. The extract investigates for its anti-inflammatory and antioxidant qualities, according to the bioactive outline.

Syngonium podophyllum (Arrowhead plant)

12 chemicals were found in the methanol extract of *Syngonium podophyllum* leaves. Phytol (21.41%), Oleic acid (19.17%), and n-Hexadecanoic acid (14.95%) were the main components. Methyl 3-bromo-1-adamantaneacetate (4.05%) and bis (2-ethylhexyl) phthalate (10.85%) were other noteworthy chemicals. These substances point to possible applications in the creation of bioactive goods for industrial and medicinal applications (Table 9, figure 9).

Opuntia microdasys (Cactus)

24 chemicals were found in *Opuntia microdasys*, with 1-butanol, 4-butoxy- (52.91%) being the most common. Other important components were n-Hexadecanoic acid (3.88%) and Oleic acid (3.27%) given in table 10 and figure 10. The composition of the extract suggests the existence of bioactive substances with potential medical and

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industrial uses. Numerous chemical compounds, were examined in the studied plants, most of them are recognized for their bioactive qualities according to the previous literature. These were consist of Sterol (such as β -Sitosterol and Stigmasterol), fatty acids (like Oleic acid and n-Hexadecanoic acid), and different phytochemicals (like Phytol and Caryophyllene), having anti-inflammatory, antioxidant, and antibacterial qualities. With the help of GC-MS, researchers can assess the efficacy of unlike plant's species in eliminating VOCs from indoor air, thus providing captious perception into the bioremediation ability of ornamental plants (3). Researchers will be able to assess the bioremediation ability of indoor plants as well as their aesthetic qualities thanks to the current study. Previous research indicates that these plants use stomatal uptake, absorption, and adsorption on plant surfaces to remove volatile organic compounds (VOCs) from indoor air. The capacity of a number of indoor species to eliminate benzene has also been previously evaluated (5). Our findings are supported by previous research work conducted on indoor plants by various researchers (15, 17) in order to exploit; their efficacy to improve indoor air quality (IAQ) by removing volatile organic compounds (VOCs) and their use in pharmaceutical industry due to the presence of highly valued organic compounds.

Conclusion and Recommendation

The GC-MS analysis of the methanolic crude extracts of the selected ten Indoor plants revealed the presence of a high level of phytochemicals. The presence of these bioactive organic compounds ensuring their antioxidant, anti-inflammatory and antimicrobial properties as per studied literature The study thus recommended the additional research work to explain the mechanism of Indoor Plants to purify the Air and bringing the studied Indoor plants in practice to make better the Pharmaceutical and agricultural Industry in future.



Epipremnum aureum



Syngonium podophyllum



Dracaena

fragrans



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Dracaena trifasciata *Rhapis excelsa*

Aucuba japonica

Table 1 Chemical composition of Methanolic extract of *Epipremnum aureum*

Peaks	Rt-Time	Compound	% age
1	2.618	p-Xylene	0.44%
2	6.385	Nonanol	0.29%
3	16.166	Phytol, acetate	0.98%
4	16.588	Phytol, acetate	0.43%
5	16.889	Hexadecanoic acid, methyl ester	1.00%
6	17.237	n-Hexadecanoic acid	10.81%
7	17.518	1-Undecene, 11-nitro-	0.77%
8	18.517	9-Octadecenoic acid, (Z)-, methyl ester	4.01%
9	18.688	Phytol	4.51%
10	18.871	Oleic acid	33.25%
11	19.094	cis-13-Octadecenoic acid	9.73%
12	19.742	9-Octadecenoic acid, (E)-	0.73%
13	20.143	Palmitoyl chloride	2.24%
14	21.187	9-Octadecenal, (Z)-	1.68%
15	21.576	9-Octadecenal, (Z)-	10.05%
16	21.806	Z-8-Methyl-9-tetradecenoic acid	2.38%
17	22.081	Bis(2-ethylhexyl) phthalate	2.95%
18	23.011	1-Butene, 4,4-dichloro-1,1,2,3,3,4-hexafluoro	0.30%
19	23.179	Pyridine-3-carboxamide, N-(2-trifluoromethylphenyl)-	3.68%
20	29.873	Campesterol	1.01%
21	30.521	Stigmasterol	3.48%
22	31.809	.gamma.-Sitosterol	5.10%

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Table 2 Chemical composition of Methanolic extract of *Dracaena trifasciata*

Peaks	Rt- Time	Compound	%age
1	12.334	Phenol, 2,5-bis(1,1-dimethylethyl)-	2.07%
2	16.171	Phytol, acetate	1.81%
3	16.411	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	0.53%
4	16.593	Phytol, acetate	0.51%
5	16.9	Hexadecanoic acid, methyl ester	5.99%
6	17.25	n-Hexadecanoic acid	7.69%
7	18.447	9,12-Octadecadienoic acid (Z,Z)-, methyl ester	23.44%
8	18.695	Phytol	3.95%
9	18.868	Oleic Acid	18.51%
10	19.103	Octadecanoic acid	5.85%
11	20.523	methyl 18-methylnonadecanoate	0.95%
12	21.586	Cyclopropaneoctanal, 2-octyl-	1.00%
13	21.836	Cyclopropaneoctanal, 2-octyl-	0.78%
14	22.086	Bis(2-ethylhexyl) phthalate	3.21%
15	22.895	1-tert-Butyl-1-hydridotetrachlorocyclotriphosphazene	3.28%
16	23.013	Carbamic acid, 4-methoxyphenyl-, allyl ester	2.24%
17	23.177	Pyridine-3-carboxamide, oxime, N-(2-trifluoromethylphenyl)-	3.25%
18	25.66	2H-1-Benzopyran-6-ol,3,4-dihydro-2,8-dimethyl-[2R[2R*(4R*,8R*)]]-	1.18%
19	27.022	.beta.-Tocopherol	1.08%
20	28.273	(+)-.gamma.-Tocopherol, 0-methyl-	1.01%
21	30.529	Stigmasterol	4.69%
22	31.815	.beta.-Sitosterol	4.39%
23	34.945	9,19-Cyclolanostan-3-ol, 24-methylene-, (3.beta.)-	2.33%

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Table 3 Chemical composition of Methanolic extract of *Rhapis excelsa*

Peak s	Rt. Time	Compound	%age
1	2.631	p-Xylene	1.52%
2	12.331	Butylated Hydroxytoluene	1.00%
3	16.172	Bicyclo[3.1.1]heptane, 2,6,6-trimethyl-, (1.alpha.,2.beta.,5.alpha.)-	5.38%
4	16.271	2-Hexadecene, 3,7,11,15-tetramethyl-, [R-[R*,R*-E]]-	1.22%
5	16.411	1,4-Eicosadiene	1.28%
6	16.594	9-Octadecyne	2.20%
7	16.908	Hexadecanoic acid, methyl ester	3.49%
8	17.263	n-Hexadecanoic acid	14.45%
9	18.532	9-Octadecenoic acid, methyl ester, (E)	8.09%
10	18.699	Phytol	4.58%
11	18.876	Oleic acid	32.31%
12	19.109	Oleic acid	9.91%
13	21.591	Octadec-9-enoic acid	2.61%
14	21.862	Cyclopropaneoctanal, 2-octyl-	1.89%
15	22.088	Bis(2-ethylhexyl) phthalate	3.52%
16	23.206	1,2-Bis(trimethylsilyl)benzene	3.81%
17	24.539	Benzene, 2-[(tert-butyldimethylsilyl)oxy]-1-isopropyl-4-methyl-	1.07%
18	28.285	dl-.alpha.-Tocopherol	1.67%

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Table 4 Chemical composition of Methanolic extract of Ficus elastica

Peaks	Rt-Time	Compound	% age
1	2.631	o-Xylene	1.19%
2	2.93	p-Xylene	0.53%
3	12.333	Phenol, 3,5-bis(1,1-dimethyl)-	1.05%
4	13.556	Cyclopenta[1,3]cyclopropa[1,2]cyclohepten-	0.76%
5	14.245	Methanone, (1-hydroxycyclohexyl)phenyl-	0.96%
6	15.927	Isopropyl myristate	0.38%
7	16.175	1,19-Eicosadiene	1.53%
8	16.274	2-Hexadecene, 3,7,11,15-tetramethyl-[R[R*,R*-(E)]]-	0.32%
9	16.414	Bicyclo[2.2.2]octane, 2-methyl-	0.48%
10	16.593	Longifolenaldehyde	0.81%
11	16.918	Hexadecanoic acid, methyl ester	1.00%
12	17.288	n-Hexadecanoic acid	3.68%
13	17.535	Maltose	0.95%
14	18.541	9-Octadecenoic acid, methyl ester, (E)-	3.38%
15	18.71%	Phytol	1.57%
16	18.905	Oleic acid	8.48%
17	19.129	Cyclohexane, 1-(1,5-dimethylhexyl)-4-(4-methylpentyl)-	3.17%
18	21.598	6-Octadecenoic acid, (Z)-	1.38%
19	22.09	Bis(2-ethylhexyl) phthalate	3.14%
20	23.744	Cyclotrisiloxane, hexamethyl-	5.33%
21	24.539	Squalene	5.65%
22	27.041	Tris(tert-butyl dimethylsilyloxy)arsane	1.40%
23	28.283	dl-.alpha.-Tocopherol	6.55%
24	31.451	2-Ethylacridine	0.85%
25	31.822	.beta.-Sitosterol	7.42%
26	32.334	.alpha.-Amyrin	2.91%
27	32.695	Lup-20(29)-en-3-one-	9.58%
28	32.998	2-Ethylacridine	1.71%
29	33.415	2-Bromo-4,5-dimethoxyccinnamic acid	7.92%
30	35.352	Fern-7-en-3.beta.-ol	15.70%

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Table 5 Chemical composition of Methanolic extract of *Ravenea rivularis*

Peaks	Rt-Time	Compound	% age
1	2.631	Benzene, 1,3-dimethyl-	1.13%
2	16.174	Phytol, acetate	6.84%
3	16.271	2-Hexadecene, 3,7,11,15-tetramethyl-, [R-[R*,R*-(E)]]-	1.04%
4	16.411	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	1.53%
5	16.595	Phytol, acetate	2.63%
6	16.914	Hexadecanoic acid, methyl ester	2.41%
7	17.282	n-Hexadecanoic acid	6.02%
8	18.537	11-Octadecenoic acid, methyl ester	4.85%
9	18.706	Phytol	2.83%
10	18.803	Methyl stearate	1.00%
11	18.898	Oleic acid	9.42%
12	19.124	9,17-Octadecadienal, (Z)-	3.86%
13	22.09	Bis(2-ethylhexyl) phthalate	3.06%
14	24.541	Squalene	6.81%
15	29.461	Scoparone	39.85%
16	30.531	Stimasterol	1.46%
17	31.824	.beta.-Sitosterol	5.12%

Table 6: Chemical composition of Methanolic extract of *Schefflera arboricola*

Peaks	Rt. Time	Compound	%age
1	2.63	p-Xylene	2.01%
2	2.929	p-Xylene	0.82%
3	10.449	(-)-Aristolene	1.00%
4	10.595	Benzaldehyde, 2,3,4,5-tetramethyl-	2.23%
5	10.872	Benzene, 1,2,4-triethyl-	2.50%
6	10.973	Cyclohexane, 1-ethenyl-1-methyl-2,4-bis(1-methylethenyl)-	1.77%
7	11.36	Caryophyllene	4.97%
8	11.782	Humulene	4.66%
9	11.957	Bicyclo[7.2.0]undec-4-ene, 4,11,11-trimethyl-8-methylene-	1.13%
10	12.18	Naphthalene, 1,2,3,4,4a,5,6,8a-octahydro-[2R-(2.alpha.,4a.alpha.,8a.beta.)]-	2.23%
11	12.3	Naphthalene, 1,2,3,4,4a,5,6,8a-octahydro-[2R-(2.alpha.,4a.alpha.,8a.beta.)]-	1.98%
12	13.245	Caryophyllene oxide	2.89%
13	13.538	3-Cyclohexen-1-carboxaldehyde, 3,4-dimethyl-	0.56%
14	15.349	Tricyclo[4.1.0.0(2,4)]heptane, 3,3,7,7-tetramethyl-5-(2-methyl-1-propenyl)-	1.19%
15	16.173	Bicyclo[3.1.1]heptane, 2,6,6-trimethyl-, (1.alpha.,2.beta.,5.alpha.)-	3.72%
16	16.592	2-Cyclohexen-1-one, 4,4-dimethyl-	1.65%
17	16.915	Hexadecanoic acid, methyl ester	2.68%
18	17.281	n-Hexadecanoic acid	9.94%
19	18.538	9-Octadecenoic acid, (Z)-, methyl ester	6.71%
20	18.703	Phytol	2.83%
21	18.906	9-Octadecenoic acid, (E)-	14.52%
22	19.123	Oleic acid	6.93%
23	21.596	1,22-Docosanediol	1.66%
24	22.089	Bis(2-ethylhexyl) phthalate	4.37%
25	23.238	1,2-Bis(trimethylsilyl)benzene	0.53%
26	24.54	Supaene	2.21%

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27	25.673	2H-Benzopyran-6-ol, 3,4dihydro-, [2R-[2R*(4R*,8R*)]]-	4.55%
28	30.536	Stigmasterol	7.49%

Table 7 Chemical composition of Methanolic extract of *Dracaena fragrans*

Peaks	Rt- Time	Compound	%age
1	2.632	p-Xylene	1.74%
2	2.93	Benzene, 1,3-dimethyl-	0.80%
3	4.118	Diglycerol	3.00%
4	11.359	Bicyclo[2.2.1]heptan-2-one, 4,7,7-trimethyl-, semicarbazone	1.28%
5	11.856	1-Nitro-2-acetamido-1,2-dideoxy-d-glucitol	0.67%
6	15.193	3-Cyclohexen-1-carboxaldehyde, 3-methyl-	1.28%
7	15.925	Isopropyl myristate	0.70%
8	16.172	Bicyclo[3.1.1]heptane, 2,6,6-trimethyl-, (1.alpha.,2.beta.,5.alpha.)-	2.41%
9	16.411	Phytol, acetate	0.50%
10	16.59	4-[3-(4-Nitrobenzyloxy)propyl]-1H-imidazole	1.48%
11	16.91	Hexadecanoic acid, methyl ester	2.01%
12	17.266	n-Hexadecanoic acid	22.50%
13	18.532	9-Octadecenoic acid, methyl ester, (E)-	6.40%
14	18.698	Phytol	4.10%
15	18.88	Oleic acid	23.77%
16	19.116	Oleic acid	8.75%
17	21.594	1,2,5-Oxadiazole-3-amine, 4-(3-methoxyphenoxy)-	1.23%
18	22.088	Bis(2-ethylhexyl) phthalate	4.99%
19	23.223	Cyclotrisiloxane, hexamethyl-	4.02%
20	27.988	1,2-Bis(trimethylsilyl)benzene	2.05%
21	30.537	Stigmasterol	0.99%
22	31.826	2-Methyl-7-phenylindole	5.18%

Table 8 Chemical composition of Methanolic extract of *Aucuba japonica*

Peak s	Rt-Time	Compound	%age
1	2.647	dl-Glyceraldehyde dimer	3.78%
2	3.973	Erythritol	1.48%
3	11.36	Caryophyllene	0.49%
4	15.181	5-Etyl-2-furaldehyde	3.46%
5	15.756	Z-11-Tetradecenoic acid	1.97%
6	15.916	i-propyl 12-methyl-tridecanoate	1.48%
7	16.172	Bicyclo[3.1.1]heptana, 2,6,6-trimethyl-(1.alpha.,2.beta.,5.alpha.)-	0.88%
8	16.59	1,5,9,13-Tetradecatetraene	0.71%
9	16.905	Hexadecanoic acid, methyl ester	9.71%
10	16.987	Formide, N-ethyl-N-phenyl	5.23%
11	17.257	n-Hexadecanoic acid	16.56%
12	18.53	9-Octadecenoic acid (Z)-, methyl ester	3.94%
13	18.696	Phytol	2.07%
14	18.87	Oleic acid	24.35%
15	19.106	2-Methyl-Z,Z-3,13-octadecadienol	7.30%
16	21.588	2-Methyl-Z,Z-3,13-octadecadienol	1.32%
17	21.842	Hexahydropyridine, 1-methyl-4-[4,5-dihydroxyphenyl]-	1.64%
18	22.087	Bis(2-ethylhexyl) phthalate	4.06%
19	23.203	1,2-Benzisothiazol-3-amine tbdms	4.68%
20	31.828	Thienol[2,3-b]pyridine-2-carboxamide, 3-amino-6-methyl-	4.89%

Table 9 Chemical composition of Methanolic extract of Syngonium podophyllum

Peaks	Rt-Time	Compound	%age
1	2.332	2-Butanone, 4-(acetyloxy)-	1.11%
2	2.625	p-Xylene	2.21%
3	16.173	Trichloroacetic acid, undec-10-enyl ester	1.18%

Online ISSN

3007-3197

Print ISSN

3007-3189

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4	16.911	Hexadecanoic acid, methyl ester	4.31%
5	17.276	n-Hexadecanoic acid	14.95%
6	18.534	9-Octadecenoic acid, methyl ester, (E)-	7.35%
7	18.698	Phytol	21.41%
8	18.899	Oleic acid	19.17%
9	19.117	Octadec-9-enoic acid	9.61%
10	22.087	Bis(2-ethylhexyl) phthalate	10.85%
11	31.21	Methyl 3-bromo-1-adamantaneacetate	3.05%
12	31.817	Ethanone, 2-(2-benzothiazolythio)-1-(3,5-dimethylpyrazolyl)-	4.80%

Table 10 Chemical composition of Methanolic extract of *Opuntia microdasys*

Peaks	Rt-Time	Compound	% age
1	2.333	2-Pentanol, acetate	0.18%
2	2.639	1,3-Dihydroxyacetone dimer	4.94%
3	2.925	dl-Glyceraldehyde dimer	0.94%
4	5.977	1-Cyclopentanone, dimethylhydrazone	1.01%
5	10.404	trans-1,3-Diethylcyclopentane	4.38%
6	10.652	2(5H)-Furanone, 5-ethyl-3-hydroxy-4-methyl-	1.00%
7	11.463	1-Butanol, 4-butoxy-	52.91%
8	12.328	Butylated Hydroxytoluene	0.91%
9	13.037	1-Cyclopropyl-2,3,3-trifluorocyclobutene	0.76%
10	13.242	10-Oxocyclodec-2-enecarboxylic acid, methyl ester	0.61%
11	13.41	1-[N-Aziridyl]propane-2-thiol	0.71%
12	13.554	Megastigmatrienone	1.37%
13	14.216	Methanone, (1-Hydroxycyclohexyl)phenyl-	1.01%
14	15.914	i-Propyl 12-methyl-tridecanoate	0.44%
15	16.581	7,9-Di-tert-butyl-1-oxaspiro(4,5)deca-6,9-diene-2,8-dione	0.52%
16	16.899	Hexadecanoic acid, methyl ester	0.44%

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3007-3197

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17	17.254	n-Hexadecanoic acid	3.88%
18	18.528	8-Octadecenoic acid, methyl ester	1.67%
19	18.695	Phytol	0.51%
20	18.874	9-Octadecenoic acid, (E)-	8.90%
21	19.109	Oleic acid	3.27%
22	22.086	Diisooctyl phthalate	3.23%
23	23.205	12,5-Oxadiazol-3-amine, 4-(4-methoxyphenoxy)-	0.72%
24	31.82	.beta.-Sitosterol	5.46%

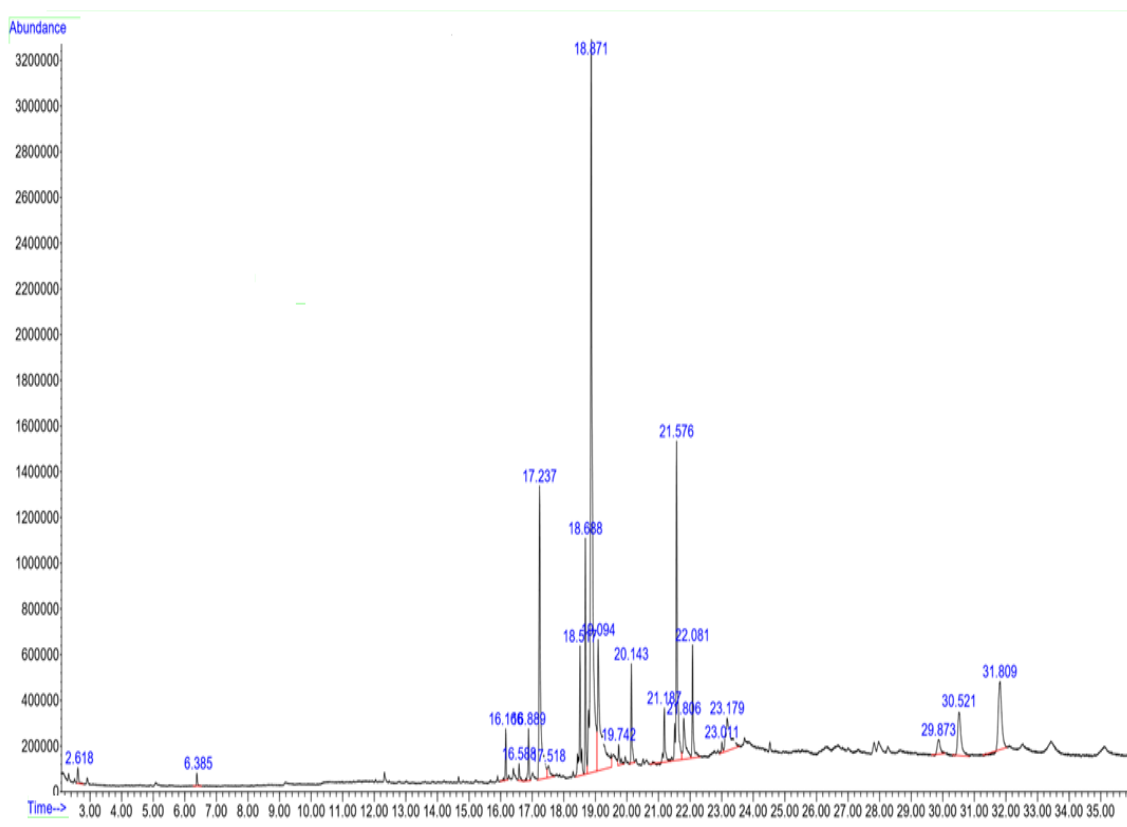


Fig. 1: Chromatogram showing the chemical composition of *Epipremnum aureum*

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3007-3197

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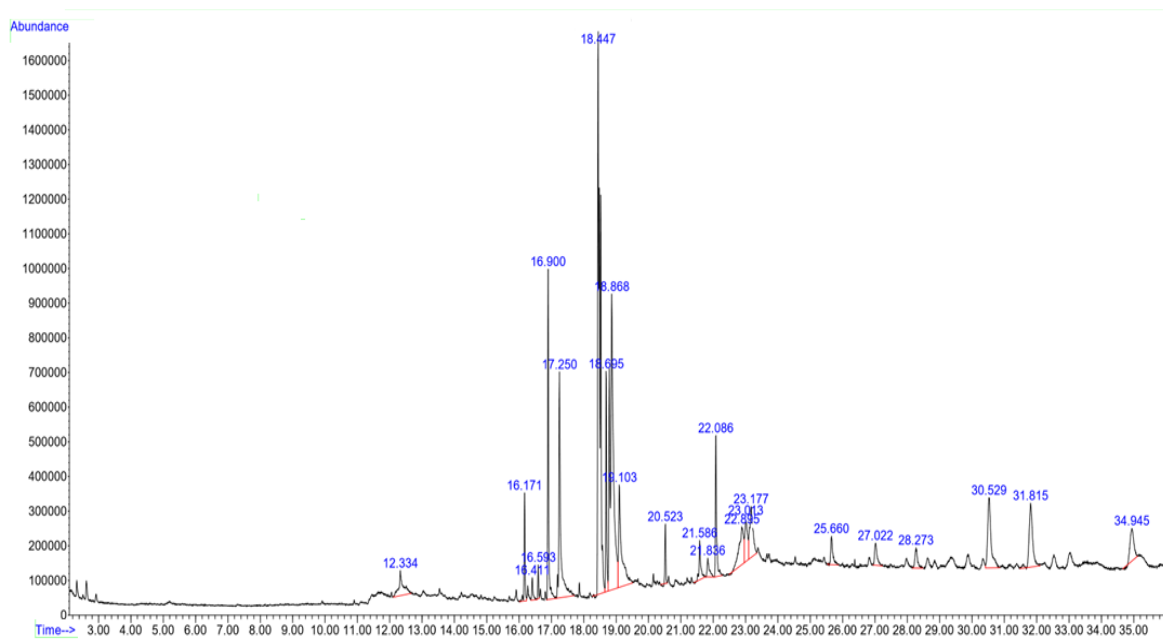


Fig. 2: Chromatogram showing the chemical composition of *Dracaena trifasciata*

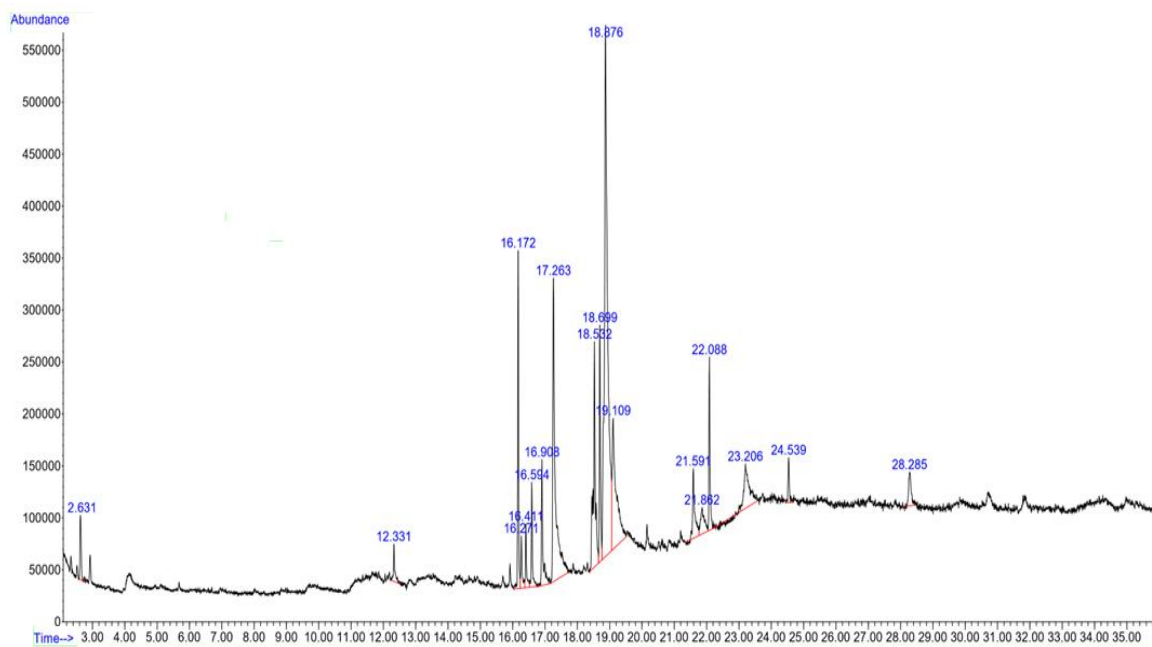


Fig. 3: Chromatogram showing the chemical composition of *Rhapis excelsa*

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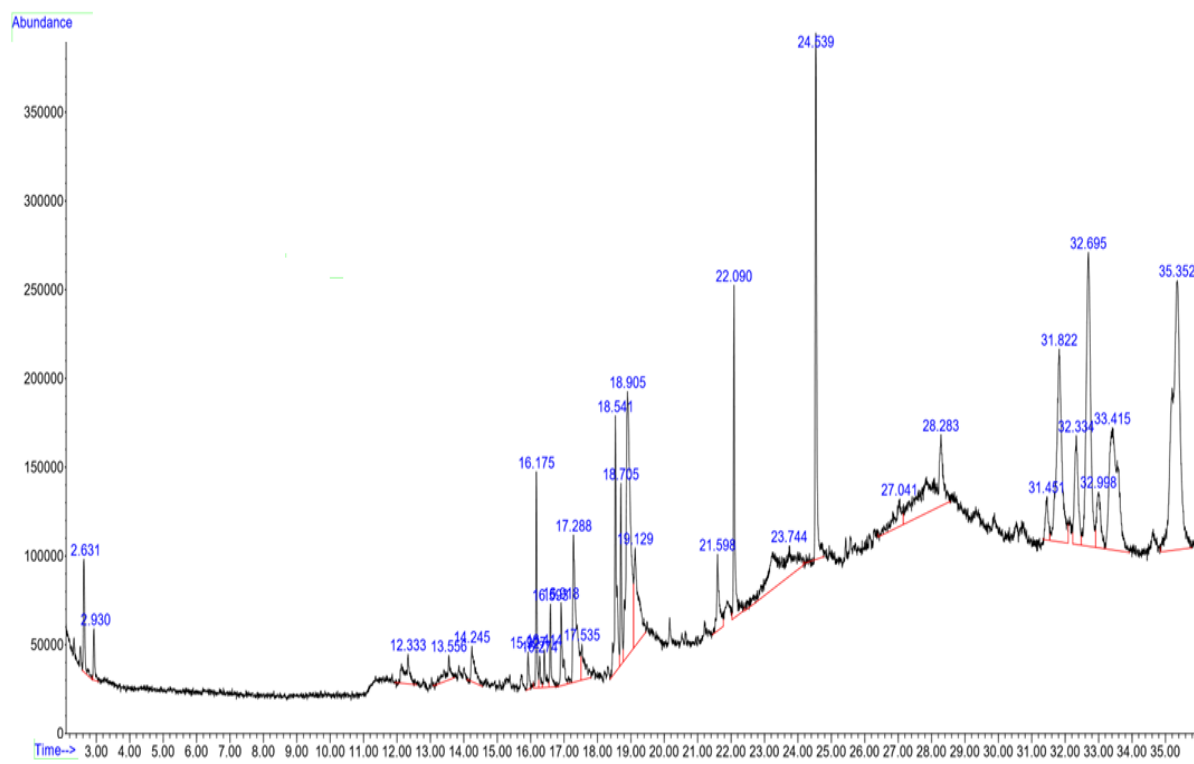


Fig. 4: Chromatogram showing the chemical composition of *Ficus elastica*

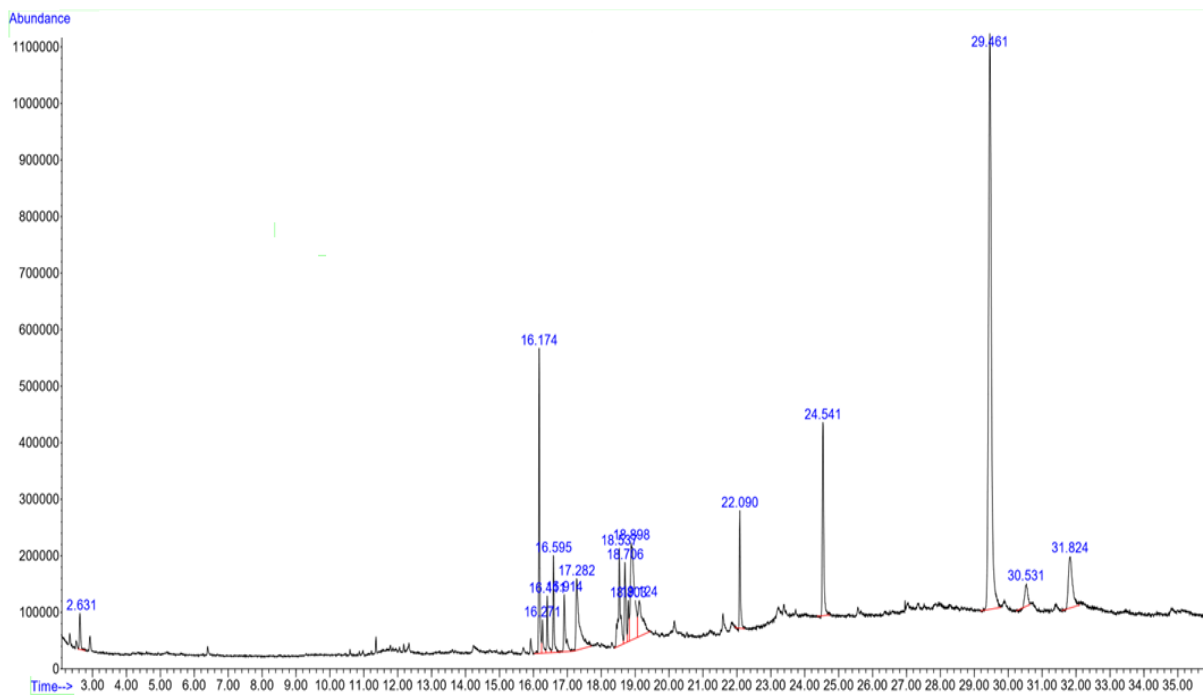


Fig. 5: Chromatogram showing the chemical composition of *Ravenea rivularis*

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3007-3197

Print ISSN

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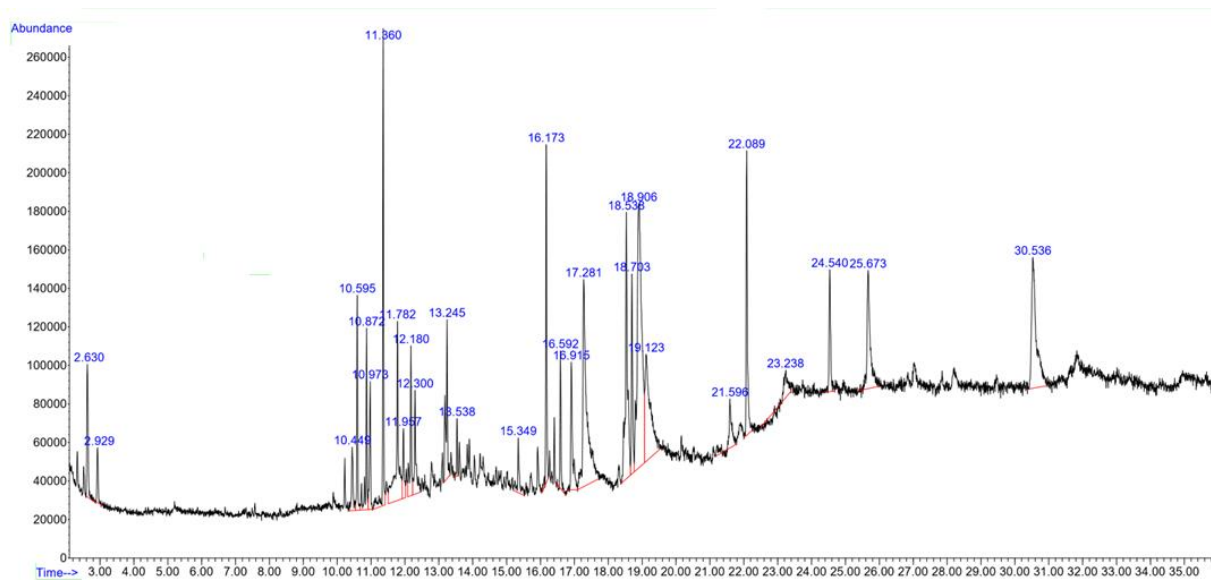


Fig. 6: Chromatogram showing the chemical composition of *Schefflera arboricola*

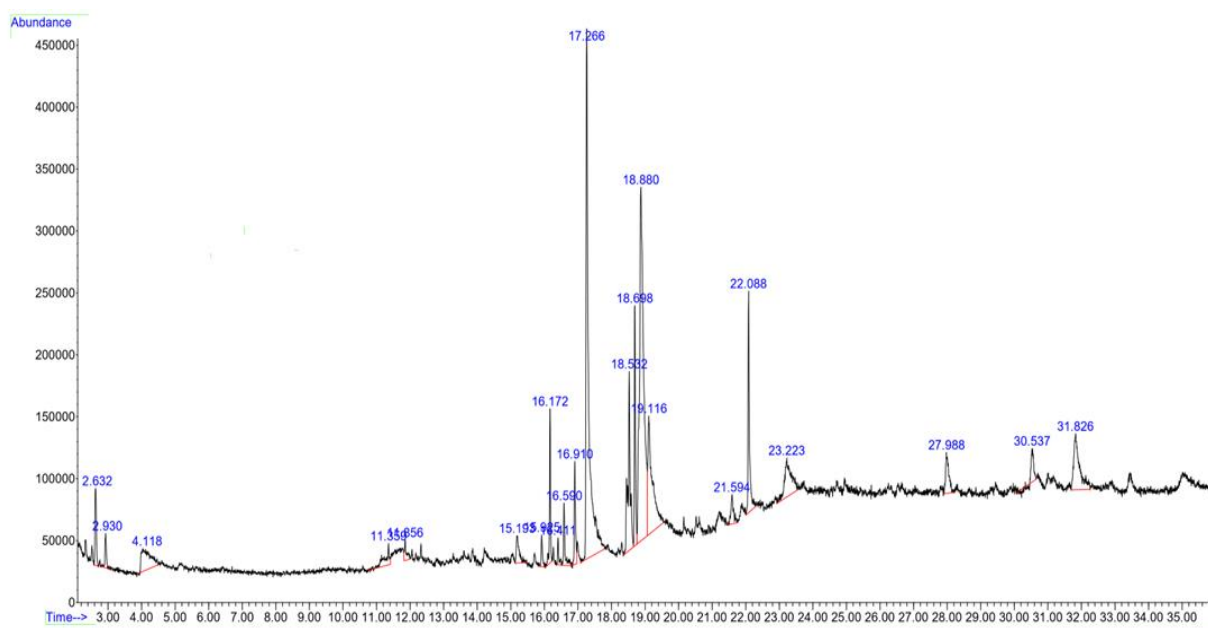


Fig. 7: Chromatogram showing the chemical composition of *Dracaena fragrans*

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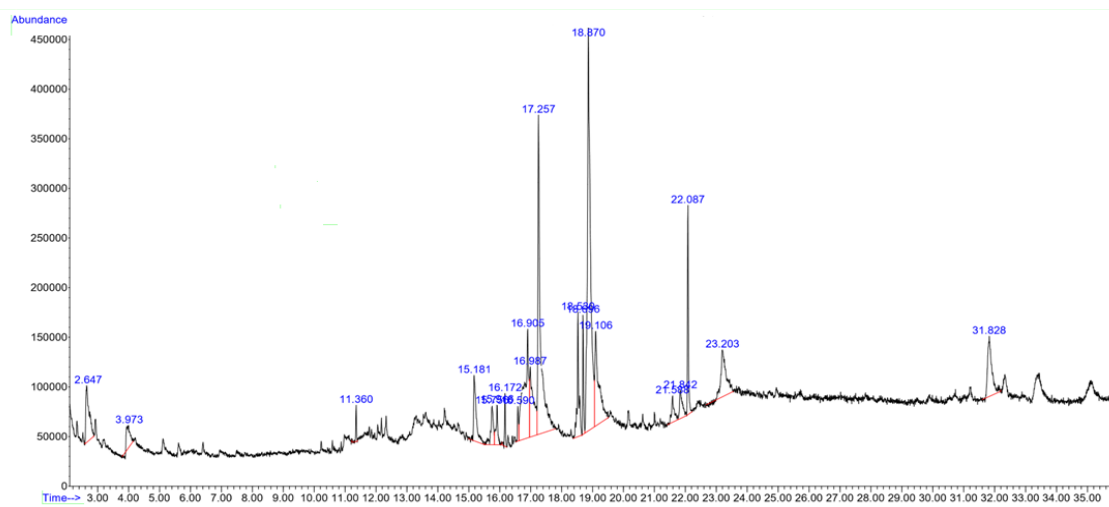


Fig. 8: Chromatogram showing the chemical composition of *Aucuba japonica*

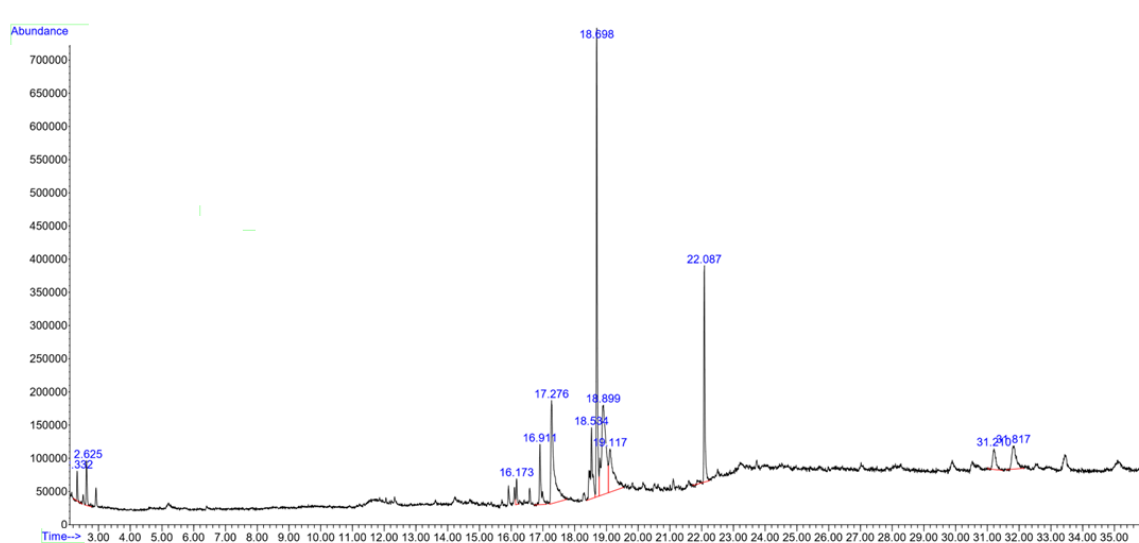


Fig. 9: Chromatogram showing the chemical composition of *Syngonium podophyllum*

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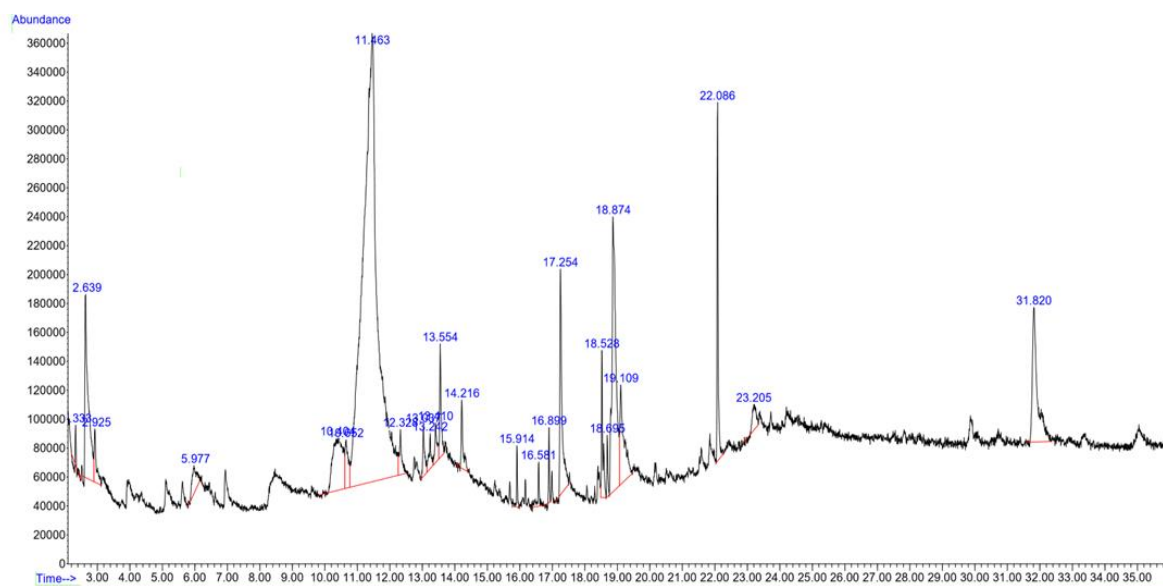


Fig. 10: Chromatogram showing the chemical composition of *Opuntia microdasys*

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