

**Determination of Bioactive Components of *Plectranthus amboinicus* Lour by GC–MS Analysis.**M. Uma<sup>1</sup>, S.Jothinayaki<sup>2</sup>, S.Kumaravel<sup>3</sup>, P.Kalaiselvi<sup>4</sup><sup>1</sup> & <sup>4</sup> Department of Medical Biochemistry, University of Madras, Taramani Campus, Chennai –600 113, Tamilnadu, India.<sup>2</sup> Prince Shri Venkateshwara Arts and Science College, Gowrivakkam, Chennai - 600 073, Tamil Nadu, India.<sup>3</sup> Scientist, Department of Food Quality and Testing, IICPT, Thanjavur - 613 005, Tamil Nadu, India.E.mail : [pkalaiselvi@yahoo.com](mailto:pkalaiselvi@yahoo.com)

**Abstract :** *Plectranthus amboinicus* (L.) (Family - Lamiaceae) is traditionally used for asthma, chronic coughs, bronchitis, and a variety of diseases affected by virus, bacteria and other microbes. The present investigation was carried out to determine the chemical constituents from *P.amboinicus* leaves by GC-MS technique. This analysis revealed the presence of 3-methyl-4- isopropyl phenol (31.70%), Squalene (10.07%), Caryophyllene (2.36%) and phytol (8.44%). The use of this plant to treat many ailments in folk and herbal medicines is justified. [M.Uma., S.Jothinayaki., S.Kumaravel., P.Kalaiselvi, Determination of Bioactive Components of *Plectranthus amboinicus* Lour by GC-MS Analysis. New York Science Journal 2011; 4(8): 66-69]. (ISSN: 1554-0200). <http://www.sciencepub.net/newyork>.

**Key words :** *Plectranthus amboinicus* L; GC–MS analysis; Bioactivity of phytoconstituents.

## 1. Introduction

Plants serve as a basis of traditional medicinal systems for thousands of years in India, Nigeria, China, Indonesia, etc. (Hammer, 1999), collectively plants produce a remarkable diverse array of over 5,00,000 low and high molecular mass natural products which are known as secondary metabolites (Fatope, 2001). Distinguished example of these compounds include flavonoids, phenols, saponins and cyanogenic glycosides (Shahidi, 2000 and shahidi *et al.*, 2008).

*Plectranthus amboinicus* (Lour) belongs to Family lamiaceae and is known as country borage in English (Kirtikar and Basu 1999). It is primarily indicated for cardio vascular diseases including hypertension, congestive heart failure and angina. It is used in the treatment of dyspepsia, impaired digestion, indigestion, asthma, chronic coughs, bronchitis, rheumatism (Prasad *et al.*, 2002). Many pharmacological properties have been reported including urolithiasis (Baskar and Varalakshmi 1992), antiepileptic (Buznego and Perez–saad 1999), antitumour and anti mutagens (Annapurani and priya 1999), neuro pharmacological (Perez saad *et al.*, 2003), radio protective effect (Rao *et al.*, 2006), antibacterial and antifungal properties (Prudent *et al.*, 1995). The aim of the present study is to determine the organic compounds present in the leaves of *Plectranthus amboinicus* by GC–MS technique, which may provide an insight in its use in folklore medicine.

## 2. Materials and Methods

### Plant material and extraction procedure

*Plectranthus amboinicus* was collected from Sembakkam, Gowrivakkam, Tambaram, Chennai, Tamil nadu. Authentication of plant material was done by Prof. P. Jayaraman of Plant Anatomy Research Centre, Tambaram, Chennai. Following identification voucher specimen of the plant was deposited in the herbarium (Parc / 2009 / 288). The powdered leaf material of *P.amboinicus* (20g) was soaked in 50ml of 80% alcohol for 12 hours and then filtered through whatman filter paper No.41 along with 2g sodium sulphate to remove the sediments and traces of water in the filtrate. Before filtering the filter paper along with sodium sulphate was wetted with absolute alcohol, the filtrate was then concentrated by bubbling nitrogen gas into the solution and concentrated to 1ml.

### Gas Chromatography – mass spectrum analysis (GC-MS)

GC-MS analysis was carried out on a GC clarus 500 perkin elmer system and gas chromatograph interfaced to a mass spectrometer (GC-MS) instrument employing the following conditions. Column Elite-1 fused silica capillary column (30mm x 0.25mm ID x 1 µ Mdf, composed of 100% Dimethyl poly siloxane), operating in electron impact mode at 70eV; Helium (99.999%) was used as carrier gas at a constant flow of 1ml / min and an injection volume of 2 ml was employed (split ratio of 10:1); Injector temperature 250°C; Ion-source temperature 280°C. the oven temperature was programmed from 110°C (isothermal for 2 min) with an increase of 10°C / min, to 200°C then 5°C / min, to 280°C, ending with a 9 min ISO thermal at 280°C.

Mass spectra was taken at 70eV; a scan interval of 0.5 seconds and fragments from 45 to 450 Da. Total GC running time was 36 min. The relative percentage of each component was calculated by comparing its average peak area to the total area. Software adopted to handle mass spectra and chromatograms was a Turbo Mass Ver5.2.0.

### Identification of components

Interpretation of mass spectrum GC-MS was conducted using the database of National Institute Standard and Technique (NIST) having more than 62,000 patterns. The Spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The

Name Molecular weight, Structure of the component of the test material was ascertained.

### 3. Result and Discussion

Nineteen compounds were identified in *P.amboinicus* leaves extract by GC-MS analysis. The active principle, Molecular weight (MW), Concentration (%), Molecular formula (MF), Retention Time (RT) and their bioactivity are presented in Figure 1, Table 1 and 2 dictates that the predominant compounds are 3- methyl - 4 - isopropyl phenol (31.70%), Squalene (10.07%), Phytol (8.44%), Durohydroquinone (2.73%) and Caryophyllene (2.36%).

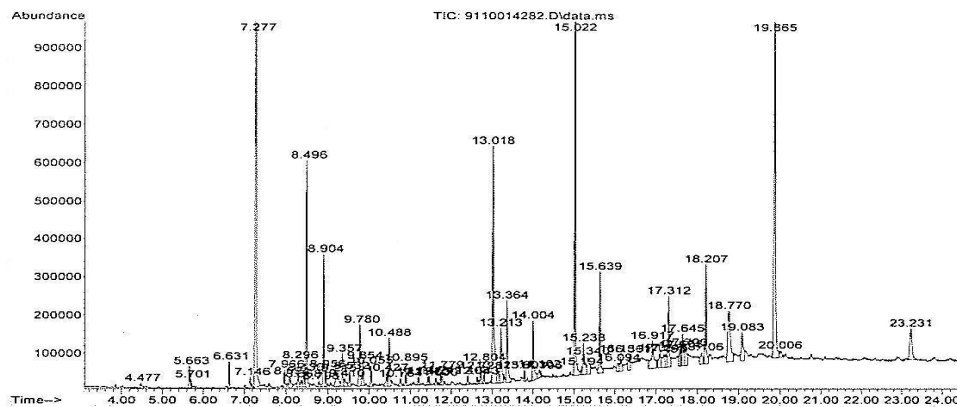


Figure 1 : Chromatogram of *Plectranthus amboinicus*

**Table1: Total ionic Chromatogram (GC-MS) of Plectranthus amboinicus obtained with 70eV using an Elite-1 fused silica capillary column with He gas as the carrier**

No	RT	Name of the Compound	Molecular formula	MW	Peak Area %
1.	13.36	3,7,11,15 – Tetramethyl -2- hexadecen -1-ol	C <sub>20</sub> H <sub>40</sub> O	296	1.8
2.	15.19	9,12 – Octadecadienoic acid (Z,Z)	C <sub>18</sub> H <sub>32</sub> O <sub>2</sub>	280	0.14
3.	7.96	Eugenol	C <sub>10</sub> H <sub>12</sub> O <sub>2</sub>	164	0.35
4.	14.00	n -.Hexadecanoic acid	C <sub>16</sub> H <sub>32</sub> O <sub>2</sub>	256	1.39
5.	23.23	Gamma tocopherol	C <sub>28</sub> H <sub>48</sub> O <sub>2</sub>	416	1.42
6.	17.14	Thymol	C <sub>16</sub> H <sub>14</sub> O	150	0.19
7.	12.41	Tetradecanoic acid	C <sub>14</sub> H <sub>28</sub> O <sub>2</sub>	228	0.20
8.	15.02	Phytol	C <sub>20</sub> H <sub>40</sub> O	296	8.44
9.	19.86	Squalene	C <sub>30</sub> H <sub>50</sub> O	410	10.07
10.	14.19	Oleic acid	C <sub>18</sub> H <sub>34</sub> O <sub>2</sub>	282	0.13
11.	5.66	Borneol	C <sub>10</sub> H <sub>18</sub> O	154	0.13
12.	4.47	1-Pentanamine	C <sub>5</sub> H <sub>13</sub> N	87	0.16
13.	10.48	1,2-Benzene diol, 4 (1,1 dimethyl ethyl)	C <sub>10</sub> H <sub>14</sub> O <sub>2</sub>	166	1.02
14.	13.21	1,4 Eicosadiene	C <sub>20</sub> H <sub>38</sub>	278	1.33
15.	31.70	3-Methyl- 4 - isopropyl phenol	C <sub>10</sub> H <sub>14</sub> O	150	31.70
16.	15.24	9,12,15-Octadecatrien -1- ol (Z,Z,Z)	C <sub>18</sub> H <sub>32</sub> O	264	1.19
17.	10.89	Caryophyllene oxide	C <sub>15</sub> H <sub>24</sub> O	220	0.43
18.	9.77	Eudesma - 4 (14), 11-diene	C <sub>15</sub> H <sub>24</sub>	204	1.34
19.	18.77	Durohydroquinone	C <sub>10</sub> H <sub>4</sub> O <sub>2</sub>	166	2.73

**Table 2. Biological activity of phyto components identified in Plectranthus amboinicus**

No	Name of the Compound	Molecular formula	Compound	**Activity
1.	3,7,11,15 - Tetramethyl -2- hexadecen -1 - ol	C <sub>20</sub> H <sub>40</sub> O	Terpene alcohol	Antimicrobial, Anti inflammatory.
2.	9,12 - Octadecadienoic acid (Z,Z)	C <sub>18</sub> H <sub>32</sub> O <sub>2</sub>	Linoleic acid	Hypocholesterolemic, Antiarthritic, Hepato protective, Anti androgenic, Nematicide, Antihistaminic, Antieczemic
3.	Eugenol	C <sub>10</sub> H <sub>12</sub> O <sub>2</sub>	Eugenol	Analgesic, Anesthetic, Anti bacterial, Anti inflammatory, Anti oxidant, Anti salmonella, Anti staphylococcus.
4.	n.Hexadecanoic acid	C <sub>16</sub> H <sub>32</sub> O <sub>2</sub>		Antioxidant, Hypocholesterolemic, Nematicide, Anti androgenic, Hemolytic inhibitor.
5.	Gamma toco pherol	C <sub>28</sub> H <sub>48</sub> O <sub>2</sub>	Tocopherol	Antioxidant, Vasodilator ,Anti tumor, Analgesic, Hepatoprotective, Anticataract, Antidiabetic
6.	Thymol	C <sub>16</sub> H <sub>14</sub> O	Thyme Camphor	Antimicrobial, Anti inflammatory ,Antiseptic, Antioxidant, Anti carcinogenic, Anti salmonella.
7.	Tetradecanoic acid	C <sub>14</sub> H <sub>28</sub> O <sub>2</sub>	Myristic acid	Antioxidant, cancerpreventive, Nematicide, Lubricant, Hypocholesterolemic.
8.	Phytol	C <sub>20</sub> H <sub>40</sub> O	Diterpene	Antimicrobial, diuretic, Anti inflammatory, Anti cancer.
9.	Squalene	C <sub>30</sub> H <sub>50</sub> O	Triterpene	Anti cancer, Anti microbial, Anti oxidant, Anti tumor chemo preventive.
10.	Oleic acid	C <sub>18</sub> H <sub>34</sub> O <sub>2</sub>	Mono unsaturated fatty acid	Anti inflammatory, Anti androgenic, Cancer preventive, Hypocholesterolemic.
11.	Borneol	C <sub>10</sub> H <sub>18</sub> O	Mono terpene alcohol	Myorelaxant, Antipyretic, Anti inflammatory, Insect repellent, nematicide, Sedative Insectifuge, Tranquilizer, Analgesic, Anti bacterial.
12.	1-Pentanamine	C <sub>5</sub> H <sub>13</sub> N	Amino Compound	Antimicrobial.
13.	1,2-Benzene diol 4-(1,1 dimethyl ethyl)	C <sub>10</sub> H <sub>14</sub> O <sub>2</sub>	Phenolic Compound	Antimicrobial, Antioxidant, Analgesic.
14.	1,4 Eicosadiene	C <sub>20</sub> H <sub>38</sub>	Alkene Compound	No activity reported.
15.	3-Methyl-4-isopropyl phenol	C <sub>10</sub> H <sub>14</sub> O	Phenolic compound	Antimicrobial, Antioxidant, Analgesic.
16.	9,12,15 - Octadecatrien-1-ol (Z,Z,Z)	C <sub>18</sub> H <sub>32</sub> O	Unsaturated alcoholic compound	Antimicrobial.
17.	Caryophyllene oxide	C <sub>15</sub> H <sub>24</sub> O	Sesquiterpene oxide	Antitumor, Analgesic, Antibacterial, Sedative, Anti inflammatory
18.	Eudesma-4 (14), 11- diene	C <sub>15</sub> H <sub>24</sub>	Sesquiterpene	Antitumor, Sedative Antibacterial, Anti inflammatory, fungicide.
19.	Durohydroquinone	C <sub>10</sub> H <sub>4</sub> O <sub>2</sub>	Phenolic compound	Antimicrobial,Antioxidant, Analgesic.

\*\*Activity Source: **Dr. Duke's Phytochemical and Ethnobotanical Database.**

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