Available online at www.pelagiaresearchlibrary.com

Pelagia Research Library

Der Pharmacia Sinica, 2011, 2 (4): 262-266

Der Pharmacia Sinica
ISSN: 0976-8688
CODEN (USA): PSHIBD

Extraction and analysis of essential oil of Nirgundi (*Vitex negundo L.*)

Anisha Singh*, Pramod K Sharma, Vipin K Garg, Sharad Visht

Department of Pharmaceutical Technology, Meerut Institute of Engineering and Technology, Meerut, India

---

ABSTRACT

All parts of the plant Vitex negundo L are known to have wide array of therapeutic activities and their essential oil is no exception. The present study was carried out to assess the chemical composition of the essential oil of the plant. The essential oil was obtained by hydro-distillation of fresh leaves of the plant in Clevenger type apparatus for approximately 8 hrs (Yield being 0.1%v/w). The extracted oil was analyzed using GC and GC/MS analysis. A total of 48 compounds were detected, of which 19 compounds represented 88.65% of the oil. The Epiglobulol was found as a major component having 30.31% concentration. Some other compounds detected in considerable range were delta-iraleine (10.34%), terpinen-4-ol (9.42%), gamma-elemene (5.72%), manool (5.16%), beta-iso-methyl ion (4.46%), beyerene (3.79%), and phytol (2.33%).

Key Words: *Vitex negundo L.*, Essential oil, GC, GC/MS.

INTRODUCTION

For the past many years, medicinal plants and their modified derivatives have received the attention of scientific communities for their therapeutic and medicinal value. Essential oil of plants shows many biological activities in addition to their use in food, flavor, perfumery, cosmetic and pharmaceutical industries. The secondary metabolites grouped as alkaloids, essential oil, glycosides etc. impart the much needed curative properties to them [1, 2]. As per World Health Organisation, about 80% of the day to day health care needs are met traditionally through medicinal and aromatic plants [3].

Vitex negundo (verbenaceae) has been found usually at an altitude of 1500 meters in the tropical and temperate regions of Afganistan, Pakistan, Sri Lanka, Eastern Africa, Thailand, Madagaskar, Malaysia, South West China, Indonesia, and Philippines etc. [4 – 6].

Vitex comprises of about 250 species having tri or pentafoliate leaves borne on quadrangular branches. It bears bluish- purple coloured flowers in pendent branched tormentose cymes [6, 7]. The plant shows anti-inflammatory, antifungal, antibacterial and analgesic activities. It is also used in traumatic epilepsy, polymenorrhoea, erratic menstrual cycles, eating disorders, amenorrhea and drug abuse etc. It finds its application in the treatment of superficial bruises, injuries, sores and skin infections as traditional medicines. Oil obtained from leaves increases hair growth and brain function. Roots play vital role in rheumatism, dyspepsia, piles etc. [8, 9]. Although all plant parts are used, but the leaves and root extract constitute more significant medicinal activity [10].

In this study, the essential oil of *Vitex negundo* was obtained by hydro-distillation and analyzed by GC and GC-MS technique.

MATERIALS AND METHODS

Plant material

Fresh leaves of *Vitex negundo* (L.) were collected from Ganeshpur village at Dehradun–Saharanpur road in April 2011. The plant was authenticated by Dr. Anjula Pandey, Principal Scientist at National Bureau of Plant Genetic Resources, Pusa Campus, NewDelhi bearing voucher specimen no. NHPC/NBPGR/2011-2

Essential oil extraction

Fresh leaves of the plant (200g) were subjected to hydro-distillation for 8 hrs using closed type Clevenger apparatus. The pale yellow colored oil was collected over water, stored in culture tube and kept in refrigeration for storage. The yield of the volatile oil obtained was 0.1% v/w [11].

GC and GC – MS analysis

GC Analysis:

The essential oil was analyzed using a Shimadzu GC-2010 Gas chromatography equipped with flame ionization detector using AB-Innowax column (60 m x 0.25 mm ID, film thickness 0.25 µm). Nitrogen was used as carrier gas at 162.1 kpa inlet pressure with 3.0 mL/min purge flow. Temperature programming was from 80°C to 230°C. Column oven temperature was held isothermal at 80°C for 2 minutes then heated at 5°C/min to 200°C and held isothermal for 8 minutes. Again it was heated at 7°C/min to 230°C and held isothermal for 15 minutes. The total program time of the instrument was 53.28 min. The injector and detector temperatures were 270°C and 280°C respectively. The injector volume of the sample was 0.2µl. The oil was injected neat with split injection mode having split ratio of 1:80. The flow control mode adopted was linear velocity of 28.7 cm/sec. The column flow was 1.21 mL/min with total flow being 101.00 mL/min. Quantitative results are mean data derived from GC analysis.

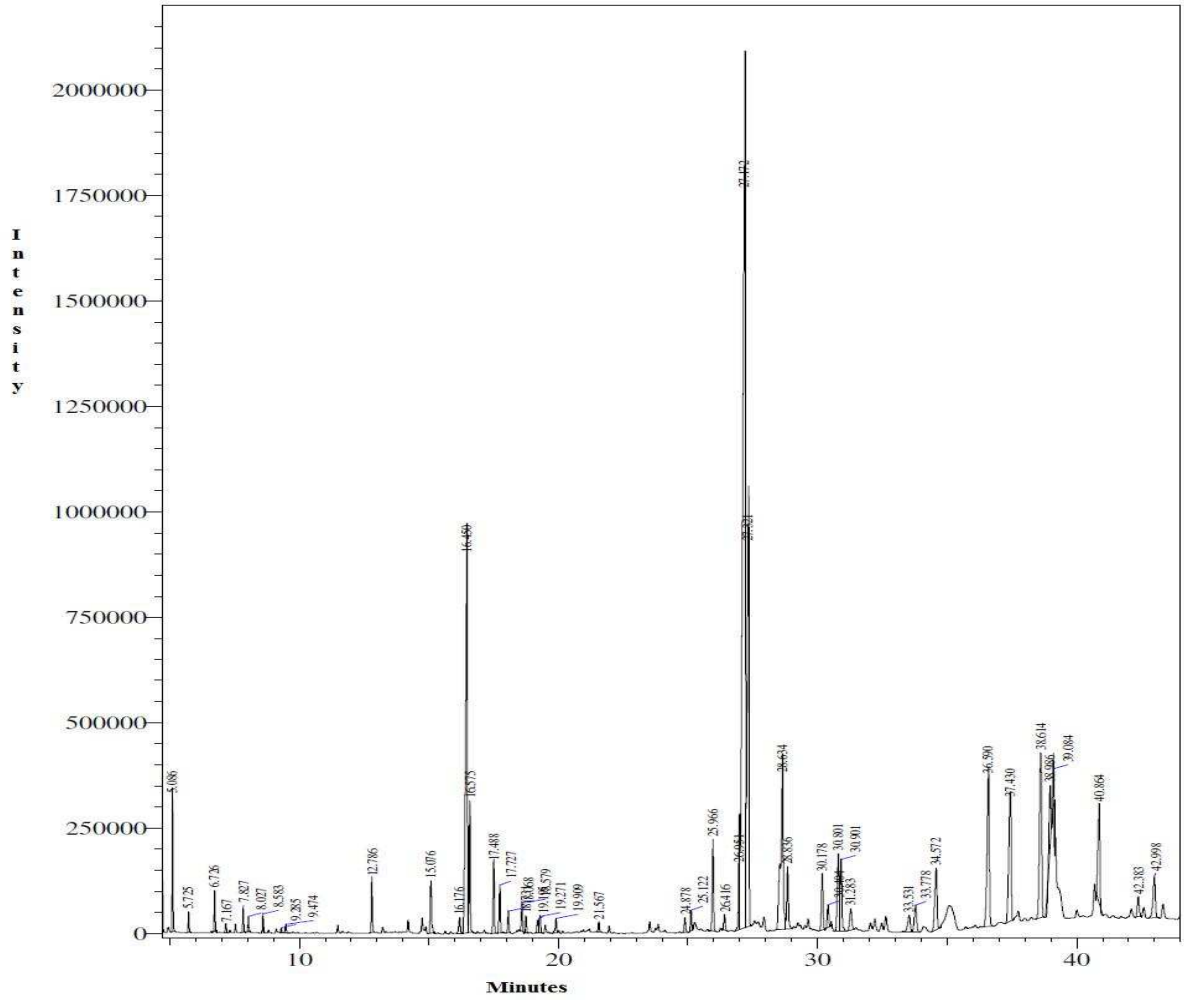
GC/MS Analysis:

GC/MS data was obtained on the Gas Chromatography-Mass Spectrometry (GC-MS)-2010 Plus Shimadzu making use of the same column. The ion source temperature was kept at 250°C with interface temperature at 280°C. The carrier gas used was helium. The temperature programming was same as in case of GC. Quantitative results are mean data derived from GC analysis. The mass range was 40 to 850 Dalton. The final confirmation of constituents was made by computer

matching of the mass spectra of peaks with the Wiley and Nist libraries mass spectral databases. Relative amounts of individual components are based on GC peak areas [12, 13].

RESULTS AND DISCUSSION

Fig. 1 Graph of GC analysis



The yield of essential oil from fresh leaves of *Vitex* negundo by hydro-distillation method using Clevenger type apparatus was found to be 0.1% v/w. The GC and GC/MS analysis showed the presence of 48 compounds, of which 19 major and some minor compounds constitute 88.71% of the oil and 11.28% were found in trace amounts. Thus all the 48 compounds made up 99.99% of the total essential oil. The major component was found to be Epiglobulol with 30.31% contrary to Lu ChangBing who found caryophyllene (35.97%) and eucalyptol (8.21%) [14], delta-iraleine (10.34%), terpinen-4-ol (9.42%), gamma-elemene (5.72%), manool (5.16%), beta-iso-methyl ion (4.46%), beyerene (3.79%), phytol (2.33%).

The retention times and chemical composition of essential oils of *Vitex negundo* are presented in Fig. 1 and Table 1.

Table 1 Retention time (RT) of different constituents' essential oil of Nirgundi

Peak	RT	Area	Area %	Name
1	5.086	676241	1.3806	Alpha-Pinene
2	5.725	109682	0.2239	Sabinene
3	6.726	214571	0.4381	Beta-Myrcene
4	7.167	55534	0.1134	Alpha-terpinene
5	7.827	143324	0.2926	Limonene
6	8.027	68399	0.1396	Sabinene
7	8.583	86292	0.1762	Gamma-Terpinene
8	9.285	31444	0.0642	Alpha-Terpinolene
9	9.474	63597	0.1298	Amyl isovalerate
10	12.786	368149	0.7516	Amyl vinyl carbinol
11	15.076	392226	0.8008	Linalool
12	16.176	159592	0.3258	Beta-Elemene
13	16.450	4616115	9.4244	Terpinen-4-ol
14	16.575	980121	2.0010	Beta-Caryophyllene
15	17.488	603134	1.2314	Allo-aromadendrene
16	17.727	376682	0.7690	(Z) beta-Farnesene
17	18.068	162933	0.3326	Alpha-Humulene
18	18.579	224949	0.4593	p-menth-1-en-8-ol
19	18.731	125197	0.2556	Viridiflorene
20	19.195	126678	0.2586	Alpha-Selinene
21	19.271	142461	0.2909	Alpha-selinene
22	19.909	122750	0.2506	Delta-Cadinene
23	21.567	73444	0.1499	Damascenone
24	24.878	136186	0.2780	Luciferin aldehyde
25	25.121	163042	0.3329	Caryophyllene oxide
26	25.966	775350	1.5830	Ledol
27	26.416	120308	0.2456	Hedycaryol
28	26.951	861087	1.7580	Elemone
29	27.172	14846843	30.3118	Epiglobulol
30	27.321	5067130	10.3452	Delta-iraleine
31	28.634	2804142	5.7250	Gamma-Elemene
32	28.836	689551	1.4078	Iso-longifolol
33	30.178	604523	1.2342	Alpha-Eudesmol
34	30.404	226744	0.4629	Beta-Eudesmol
35	30.801	913282	1.8646	Widdrol
36	30.901	847457	1.7302	Sclareol
37	31.283	302514	0.6176	Chamigrene
38	33.531	271852	0.5550	Manoyl oxide
39	33.778	379001	0.7738	Isophyllocladene
40	34.572	862053	1.7600	Delta-Guaiene
41	36.590	2187998	4.4671	Beta-iso-Methyl ion
42	37.430	1858561	3.7945	Beyerene
43	38.614	2530848	5.1671	Manool
44	38.986	455465	0.9299	Humulane-1,6-diene
45	39.084	191147	0.3903	Epimanool
46	40.864	1142947	2.3335	Phytol
47	42.383	232288	0.4742	13,15- Octacosadiyne
48	42.998	586501	1.1974	Thunbergol
Total		48980335	100.0000	

Acknowledgement
The authors are thankful to Mr. Ajay Kumar, AIRF, JNU, New Delhi for his valuable contribution in carrying out analysis and interpretation of GC and GC/MS data.

REFERENCES

[1] Najafi S, SadeghiNejad B, Deokule SS, Estakhr J, *Res J Pharm Bio Chem Sci*, **2010**, 1, 388.
[2] Derwich E, Benziane Z, Boukir A, Benaabidate L, *Chem Bull "POLITEHNICA" Univ (Timisoara)*, **2009**, 54, 85.
[3] Chowdhury JA, Islam MS, Asifuzzaman SK, Islam MK, *J Pharm Sc. & Res*, **2009**, 1, 103.
[4] Zhenga CJ, Tang WZ, Huanga BK, Hana T, Zhanga QY, Zhanga H, Qin LP, *Phytomedicine*, **2009**, 16, 560.
[5] Zaware BB, Nirmal SA, *Res J Pharm Bio Chem Sci*, **2010,** 1, 104.
[6] Vishwanathan AS, Basavaraju R, *Europ J Biol Sci*, **2010**, 3, 30.
[7] Dongmo AB, Azebaze AGB, Donfack FM, Dimo T, Efouet PAN, Devkota KP, Sontia B, Wagner H, Sewald N, Vierling W, *J Ethnopharmacol*, **2011**, 133, 204.
[8] Tripathi YB, Tiwari OP, Nagwani S, Mishra B, *Indian J Med Res*, **2009**, 130, 479.
[9] Azarnia M, Ejtemaei-Mehr S, Shakoor A, Ansari A, *Acta Med Iran*, **2007,** 45, 263.
[10] Azhar-ul-Haq, Malik A, Khan MTH, Anwar-ul-Haq, Khan SB, Ahmad A, Choudhary MI, *Phytomedicine*, **2006**, 13, 255.
[11] Moronkola DO, Ogukwe C, Awokoya KN, *Der Chemica Sinica*, **2011**, 2, 255.
[12] Halimi M, Vahedi H, Lari J, Nasrabadi M, *Der Pharmacia Sinica*, **2011**, 2, 27.
[13] Nezhadali A, Parsa M, *Adv Appl Sci Res*, **2010**, 1, 174.
[14] ChuanBing L, Ming X, YuQing L, AiHong L, HongTao W, *Acta Entomol. Sin*. **2009**, 52, 159.