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PHYTOCHEMICAL STUDIES AND GC-MS ANALYSIS OF THE *ABIES PINDROW*

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ABSTRACT

The hydro-distilled essential oil of *Abies pindrow* has been examined by means of gas chromatography-mass spectrometry (GC-MS).The oil constituents were identified according to their mass spectra and their relative retention indices. Fifty-three constituents have been identified representing 95.93% of the total oil. The main compounds in major amounts were + R(-)Limonene (19.50%), α- Pinene (15.76%), Epi-α-Bisabolol (10.92%), β-Pinene (10.43%), Monoterpene hydrocarbons are present in its significant amount (60.26%), followed by oxygenated sesquiterpene (16.69%). Such results are reported very first time.

KEYWORDS: + R(-)Limonene, α- Pinene, β-Pinene, Terpenoid composition, Essential oil, GC-MS Mass spectroscopy

INTRODUCTION

The Pinaceae (pine family) are trees or shrubs, including many of the well-known conifers of commercial importance such as cedars, firs, hemlocks, larches, pines and spruces. They are the largest extant conifer family in species diversity, with between 220 and 250 species in 11 genera (Aljos 1998 & Christopher 2015). *Abies* are a genus of 48–56 species of evergreen coniferous trees in the family Pinaceae. They are found through much of North and Central America, Europe, Asia, and North Africa, They are large trees, reaching heights of 10–80 m (33–262 ft) tall and trunk diameters of 0.5–4 m (1 ft 8 in–13 ft 1 in) when mature. Firs can be distinguished from other members of the pine family by the unique attachment of their needle-like leaves and by their different cones(Chopra *et al.*, 1956 & Asolkar *et al.*, 1992). Abies pindrow plant is used for preventation and treatment of various diseases in folk and

traditional system of medicine, It is useful in cough, haemorrhoea, pthathis ,asthma, chronic, bronchitis, thorat hoarsenees (Nadkarni 1927& Hussian *et al*., 2004). & other pulmonary affections. The bark is added to tea & used for treatment of rheumatishm & quick healing of cuts & wounds(Shah *et al*., 1971 & Kumar *et al*., 2009).

EXPERIMENTAL

Plant material

The leaves of *Abies pindrow* were collected in the month of August 2015 from Mukteshwar near Nainital, location of Kumaon Himalayas, Mukteshwar belongs to high altitude region, The plant was authenticated by Botanical Survey of India (BSI).

Essential oil extraction

The leaves of *Abies pindrow* were extracted by hydro distillation method for 6 hours using Clevenger apparatus ((Anonymous *et al*.,1996). with 800 g of leaves of each sample. the oil yield was so good in *Abies pindrow*, The oil was dried with anhydrous sodium Sulphate and stored at room temprature in a sealed vial until analysis was performed. The percentage oil yield was calculated based on the dry weight of the leaf. The oil yield were(0.19%).

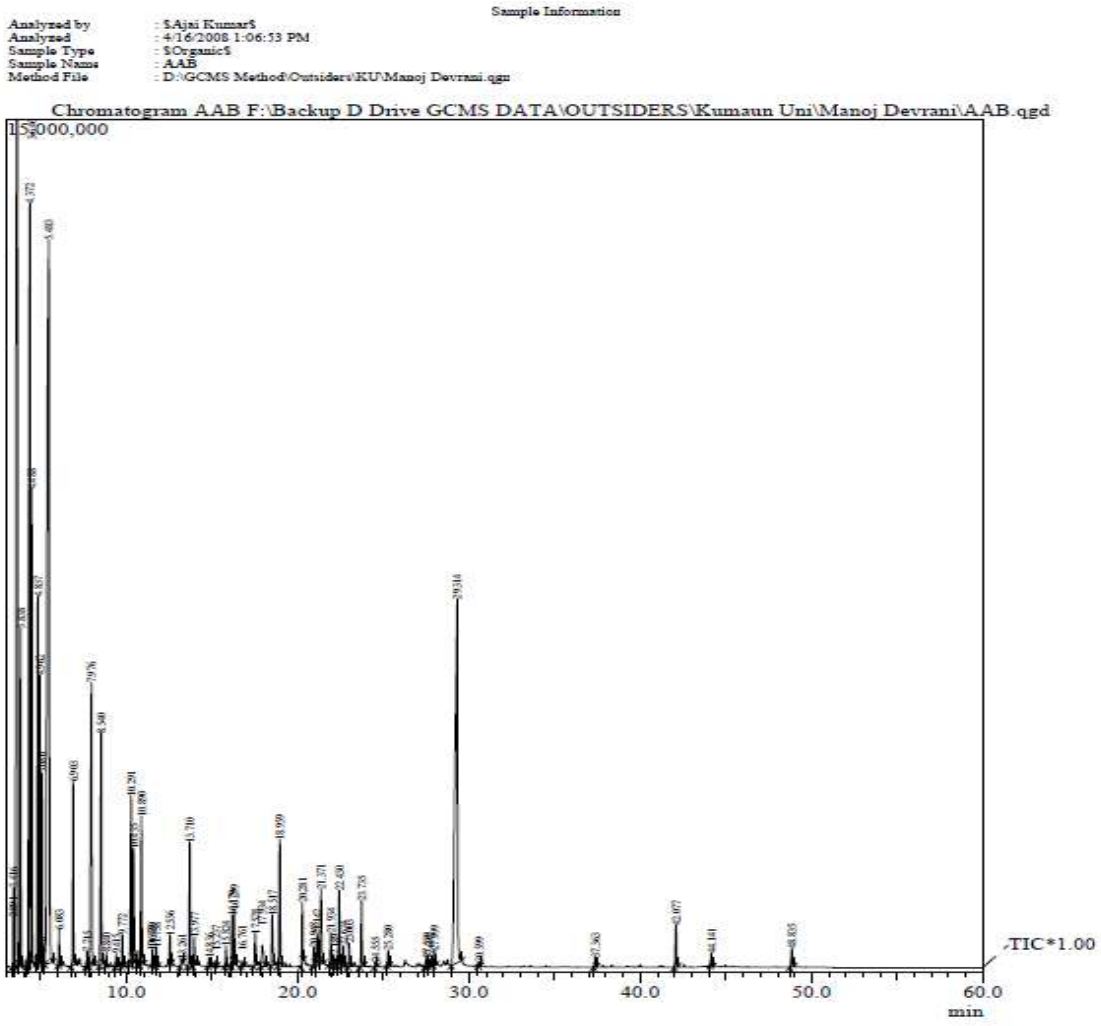
GC-FID and GC-MS analysis

Essential oil analysis was performed by using GC-MS and GC-FID was performed on a Shimadzu QP-2010 instrument, equipped with FID, in the same conditions, except hydrogen was used as the carrier gas. The percentage composition of the oil samples were computed from the GC peak areas without using correction for response factors. The oils were analyzed using a Shimadzu GC/MS Model QP 2010 Plus, equipped with a Rtx-5MS (30 m ×0.25 mm; 0.25 mm film thickness) fused silica capillary column. Helium was used as carrier gas adjusted to 1.21 ml/min at 69.0 KPa; splitless injection of 1 mL, of a hexane solution; injector and interface temperature were 270oC; oven temperature programmed was 50–280oC at 3 C/min. EIMS: electron energy, 70 eV; ion source temperature was 230^{o}C.

Identification of constituents were done on the basis of Retention Index (RI, determined with reference to homologous series of n-alkanes C8-C28, under identical experimental condition), MS library search (NIST and WILEY), and by comparison with MS literature data (Adams *et al.*, 2001).

RESULT AND DISCUSSION

The GC and GC-MS analysis of leaf oil of *Abies pimdrow* resulted in the identification of fifty-three, constituents, Both the major as well as minor constituents were identified by their retention indices and comparison of their mass spectra. Total fifty-three constituents were identified constituting 95.93%, of the total oil. The main compounds in major amounts were + R(-)Limonene (19.50%), α- Pinene (15.76%), Epi-α-Bisabolol (10.92%), β-Pinene (10.43%), The compound in trace amount were, Myrtenyl acetate (0.05%), Sabinene (0.06%), (-) Nerolidol (0.10%), monoterpene hydrocarbons constituted major portion of the oil (60.26%), followed by oxygenated sesquiterpenes (16.69%), than oxygenated monoterpene (11.18%), and diterpenes (both hydrocarbons and oxygenated) were in least amount, so result shows monoterpenes hydrocarbons were found in the oil as major components.it can be a very good source of + R(-)Limonene in future. first time such report were observed.



GC-Chromatogram of Abies pindrow

Table: 1 Essential oil composition of of *Abies pindrow*.

S.N.	Compound	Area %	Mol. formula	Mol. Wt.	RI	Mode of identification
1.	Santene	0.28	C_9H_{14}	112	884	a,b
2.	tricyclene	0.75	$C_{10}H_{16}$	136	920	a,b
3.	α-pinene	15.76	$C_{10}H_{16}$	136	934	a,b
4.	Sabinene	0.06	$C_{10}H_{16}$	136	969	a,b
5.	Camphene	2.21	$C_{10}H_{16}$	136	978	a,b
6.	β-pinene	10.43	$C_{10}H_{16}$	136	978	a,b
7.	Myrcene	3.75	$C_{10}H_{16}$	136	992	a,b
8.	α- Phellandrene	3.16	$C_{10}H_{16}$	136	1003	a,b
9.	(+)-3-Carene	2.26	$C_{10}H_{16}$	136	1010	a,b
10.	α- Terpinene	1.70	$C_{10}H_{16}$	136	1014	a,b
11.	(+)-(R)-Limonene	19.50	$C_{10}H_{16}$	136	1024	a,b
12.	γ-Terpinene	0.26	$C_{10}H_{16}$	136	1054	a,b
13.	β-Linalool	0.14	$C_{10}H_{18}O$	154	1082	a,b
14.	(E)-p-2-Menthen-1-ol	2.93	$C10H_{18}O$	154	1109	a,b
15.	Fenchyl alcohol	4.0	$CH_{18}O$	142	1123	a,b
16.	Camphene hydrat	0.11	$C_{10}H_{18}O$	154	1145	a,b
17.	Isoborneol	0.12	$C_{10}H_{18}O$	154	1165	a,b
18.	Terpinen-4-ol	0.33	$C_{10}H_{18}O$	154	1175	a,b
19.	α-Terpineol	2.04	$C_{10}H_{18}O$	154	1186	a,b
20.	cis-Piperitol	1.16	$C_{10}H_{18}O$	154	1195	a,b
21.	trans-Piperitol	0.16	$C_{10}H_{18}O$	154	1205	a,b
22.	Citronellol	0.19	$C_{10}H_{20}O$	156	1223	a,b
23.	Carvacryl methyl ether	0.18	$C_{11}H_{16}O$	164	1233	a,b
24.	Piperitone	0.28	$C_{10}H_{16}O$	152	1260	a,b
25.	Bornyl acetate	1.38	$C_{12}H_{20}O_2$	196	1285	a,b
26.	Undecan-2-one	0.34	$C_{11}H_{22}O$	170	1294	a,b
27.	Menthyl acetate	0.10	$C_{12}H_{22}O_2$	198	1304	a,b
28.	Myrtenyl acetate	0.05	$C_{12}H_{18}O_2$	194	1326	a,b
29.	Trans-Piperitol acetate	0.22	$C_{12}H_{20}O_2$	196	1348	a,b
30.	α-Terpinyl acetate	0.50	$C_{12}H_{20}O_2$	196	1350	a,b
31.	Citronellyl acetate	0.56	$C_{12}H_{22}O_2$	198	1352	a,b
32.	Geranyl acetate	0.47	$C_{12}H_{20}O_2$	196	1380	a,b
33.	DODECANAL	0.71	$C_{12}H_{24}O$	184	1412	a,b
34.	Undeca-2,4-dien-1-ol	0.42	$C_{11}H_{20}O$	168	1420	a,b
35.	(E)-Caryophyllene	1.63	$C_{15}H_{24}$	204	1424	a,b
36.	α-Humulene	0.68	$C_{15}H_{24}$	204	1454	a,b
37.	n-Dodecan-1-ol	0.48	$C_{12}H_{26}O$	186	1457	a,b
38.	Germacrene D	1.06	$C_{15}H_{24}$	204	1480	a,b
39.	β-Alaskene	0.42	$C_{15}H_{24}$	204	1494	a,b
40.	(Z)-α- Bisabolene	0.16	$C_{15}H_{24}$	204	1504	a,b
41.	β- Bisabolene	0.92	$C_{15}H_{24}$	204	1508	a,b
42.	γ- Bisabolene	0.26	$C_{15}H_{24}$	204	1511	a,b
43.	δ-Cadinene	0.28	$C_{15}H_{24}$	204	1518	a,b
44.	(E)- α--Bisabolene	0.81	$C_{15}H_{24}$	204	1540	a,b
45.	(E)->Nerolidol	0.07	$C_{15}H_{26}O$	222	1561	a,b

46.	Caryophyllene oxide	0.18	$C_{15}H_{24}O$	220	1587	a,b
47.	T-Muurolol	0.26	$C_{15}H_{26}O$	222	1645	a,b
48.	Epicubenol	0.10	$C_{15}H_{26}O$	222	1646	a,b
49.	Cadin-4-en-10-ol	0.19	$C_{15}H_{26}O$	222	1659	a,b
50.	epi-α-Bisabolol	10.92	$C_{15}H_{26}O$	222	1679	a,b
51.	Abietadiene	0.56	$C_{20}H_{32}$	272	2087	a,b
52.	Abienol	0.15	$C_{20}H_{34}O$	290	2152	a,b
53.	Tetracosane	0.29	$C_{24}H_{50}$	338	2400	a,b
		95.93				

a=Retention Index (RI), b=MS (GC-MS)

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