FLAVOUR AND FRAGRANCE JOURNAL, VOL. 12, 91–93 (1997)

Composition of the Flower, Leaf and Stem Essential Oils from *Laurus nobilis* L.

C. Fiorini,[1] I. Fourasté,[1] B. David[2] and J. M. Bessière[3]

[1]*Laboratoire de Pharmacognosie, Faculté de Pharmacie, 35, Chemin des Maraîchers, 31062 Toulouse, France*
[2]*Institut de Recherche Pierre FABRE, Laboratoire de Phytochimie, 16 Rue Edmond Rostand, 81603 Gaillac, France*
[3]*Ecole Nationale Supérieure de Chimie, 8 Rue de l'Ecole Normale, 34075 Montpellier, France*

The composition of the essential oil from the flowers of *Laurus nobilis* L. shows differences with the essential oil of the leaves with a high content of β-caryophyllene (10.0%), viridiflorene (12.2%), germacradienol (10.1%), β-elemene (9.7%) and (*E*)-ocimene (8.0%). Differences between the flower oil and the oils of stem wood and stem bark were also investigated.

Flavour Fragr. J., **12**, 91–93 (1997) (No. of Figures: 0 No. of Tables: 1 No. of Refs: 11)

KEY WORDS: *Laurus nobilis* L.; Lauraceae; essential oil; flowers; leaf; stem bark; stem wood

INTRODUCTION

Laurus nobilis L. belongs to the family Lauraceae, which comprises numerous aromatic and medicinal plants. The essential oil of leaves have antibacterial and antimicrobial properties.[1,2] Different studies made on this oil show influence of the area of culture,[3] of variety[4] and harvest season[5] on the chemical composition. The essential oil of stems[6] and fruits[7] has also been analysed. Our present study completes these works with the analysis of flower essential oil, and compares it with that of the leaves and stems.

EXPERIMENTAL

Plant Material

Plant material was collected from French trees, located near Toulouse, in March 1994 and was made up of petiole, calyx and corolla.

Isolation and Analysis

Essential oils were obtained by hydrodistillation over 2 hours, performed using 300 g of fresh flowers, 500 g of fresh leaves, 100 g of bark stem or 100 g of wood stem.

Correspondence to: B. David.

CCC 0882–5734/97/020091–03$17.50

They were analysed by GC–MS on a Hewlett-Packard capillary GC-quadrupole MS system (Model 5970) fitted with a fused-silica DB-1 column (30 m × 0.23 mm i.d.); the oven temperature was programmed from 50°C to 200°C at 3°C/min. Carrier gas was helium, injection volume, 0.5 µl and split ratio, 1/30. Components were identified by comparison with their mass spectra and their retention indices with those of reference compounds.[8–11]

RESULTS AND DISCUSSION

The flowers gave pale yellow essential oil in 0.18% yield (w/w). The essential oil of the leaves, stem bark and stem wood have the same colour and the extraction yields are respectively 0.57%, 0.68% and 0.07%.

Results of the chromatographic analyses are presented in the Table 1. Several compounds of the stem and flower essential oils could not be identified, but identification of the components of the leaf essential oil is almost complete. The flower essential oil composition, compared with that of the leaves, is characterized by a high content of (*E*)-ocimene and sesquiterpenic compounds, mainly β-caryophyllene, viridiflorene, β-elemene, germacrene-D-4-ol and germacrene-D, all these

Received 10 February 1996
Accepted 23 May 1996

Table 1. Comparison of percentage composition of the essential oils of flowers, leaves and stems of *Laurus nobilis* L.

Compounds	Retention indices[a]	Flowers (%)	Leaves (%)	Stems (%)	
				Bark	Wood
α-Thujene	923		0.1		
α-Pinene	929	0.7	2.2	0.4	
Camphene	943	0.2	0.2		
Sabinene	966	0.5	4.4	0.7	
β-Pinene	970	0.5	1.7	0.4	
Myrcene	982		0.3	0.2	
1,8-Cineole	1025	3.3	39.1	73.0	1.6
Limonene	1027	0.2	2.6	0.2	
β-Phellandrene	1027		0.3		
(*Z*)-Ocimene	1029	0.6			
(*E*)-Ocimene	1039	8.0			
Linalol	1089	0.2	10.0	0.4	3.2
δ-Terpineol	1159				0.2
Terpinen-4-ol	1171		1.4	2.3	2.4
α-Terpineol	1178	0.3	1.3	0.9	2.4
Linalyl acetate	1240		0.2		
Bornyl acetate	1269	0.4	0.2	0.1	0.2
Undecan-2-one	1279	0.2			
Terpinen-4-yl acetate	1302		0.5		
α-Terpinyl acetate	1330	2.3	18.2	3.8	18.6
Eugenol	1337			0.9	7.8
α-Cubebene	1347			1.8	1.2
α-Copaene	1362	0.3		1.8	0.9
β-Cubebene	1372			0.2	6.0
Methyleugenol	1383	3.1	11.8	4.7	16.0
β-Elemene	1388	9.7	0.5	0.5	
β-Caryophyllene	1418	10.0	1.6	0.1	1.0
$C_{15}H_{24}$	1443	0.3		0.2	0.3
α-Humulene	1449	1.2	0.1	0.1	0.8
$C_{15}H_{24}$	1453	0.2			0.2
ε-Muurolene	1457				0.5
Germacrene D	1479	6.1	0.1	0.4	1.2
β-Selinene	1485	0.3			0.5
Epicubebol	1492			0.1	6.0
Calamenene + $C_{15}H_{26}O$	1492				0.7
Viridiflorene	1493	12.2	0.5		
γ-Cadinene	1512	4.3			0.5
$C_{15}H_{26}O$	1515	2.2		0.7	
$C_{15}H_{24}O$	1517	0.5		0.3	
δ-Cadinene	1518	0.5	0.1	1.0	3.6
Cubebol	1529			0.1	8.1
Elemicine	1531			0.2	0.8
M = 222	1532	0.3			0.2
Humuladienol	1546	2.3			
Elemol	1548	0.6			
M = 220	1573				0.5
Germacrene-D-4-ol	1580	10.1	0.9	0.1	0.4
Ledol	1586	0.4			
M = 222	1591				0.5
Viridiflorol	1594	1.0			
Caryophyllene oxide	1599	0.3			0.2
Not determined	1604	0.9			
Not determined	1620	0.4			
M = 222	1625			0.3	2.3
Not determined	1626	0.6			
Gossonorol	1636	0.3		0.3	2.2
Not determined	1637	1.3			1.1

Table 1. Continued

Compounds	Retention indices[a]	Flowers (%)	Leaves (%)	Stems (%)	
				Bark	Wood
β-Eudesmol	1654	2.3		0.4	3.4
α-Cadinol	1657	3.4		0.1	1.1
M = 222	1664	1.3			
M = 220	1671	0.4			
Not determined	1686	0.4			
Not determined	1695	1.5			0.8
Not determined	1760	0.7			
Not determined	1820	0.4			

[a] On DB-1

products proceeding from (*E*, *E*)-farnesylpyrophosphate. Regarding the leaves, our study shows results close to the literature,[2–4] with 1,8-cineole, linalol, methyleugenol and α-terpinyl acetate as the major components.

The bark and stem essential oils are characterized by a high content of 1,8-cineole; the main components in the wood are α-terpinyl acetate, methyleugenol and α-copaene. The importance of phenylpropanoid compounds is not surprising as stem wood contains lignin which is of the same biogenetic origin. Different results were found by Kekelidze[6] in Russian plants with sabinene, linalol, terpinen-4-ol and 1,8-cineole as major components. Only the last was found in stems of French plants.

In conclusion, our study has shown that the chemical composition of the flower essential oil is very different from that of other parts of the plant (leaves, stem bark and stem wood).

REFERENCES

1. M. Syed and F. M. Chaudhry, *Pak. J. Sci. Ind. Res.*, **34**, 456 (1991).
2. F. S. Frazao and D. A. Benigni, *Planta Med.*, **55**, 103 (1989).
3. A. Zola, J. P. Le Vanda and F. Guthbrod, *Plant. Med. et Phythother.*, **XI**, 241 (1977).
4. H. Howerda, R. Bos, D. H. E. Tattje and Th. M. Malingre, *J. Med. Plant Res.*, **44**, 116 (1982).
5. M. Riaz, C. M. Ahsraf and F. M. Chaudhry, *Pak. J. Sci. Res.*, **32**, 33 (1989).
6. N. A. Kekelidze, *Chemistry of Natural Compounds*, **3**, 384 (1987).
7. M. C. Nigam, D. A. Ateeque and L. N. Misra, *Parfümerie und Kosmetik*, **12/92**, 1856 (1973).
8. E. Stehagen, S. Abrahamson and F. W. McLafferty, in *Registry of Mass Spectral Data*, Wiley, New York (1974).
9. W. Jennings and T. Shibamoto, *Qualitative Analysis of Flavor and Fragrance Volatiles by Glass Capillary Gas Chromatography*, Academic Press, New York (1980).
10. A. A. Swigar and R. M. Silverstein, *Monoterpenes: Infrared, Mass, ^{1}H-NMR and ^{13}C-NMR Spectra and Kovats Indices*, Aldrich Chemical Co, Milwaukee, WI (1981).
11. R. P. Adams, *Identification of Essential Oils by Ion Trap of Mass Spectrometry*, Academic Press, New York (1989).