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Article in *Journal of Essential Oil Research* - December 2011


DOI: 10.1080/10412905.1999.9701125

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Essential Oils of *Thymus striatus* Vahl var. *interruptus* Jalas from Turkey

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Abstract

Water-distilled essential oils of *Thymus striatus* var. *interruptus* collected from four different locations in Turkey were analyzed by GC/MS. β -Caryophyllene, thymol, carvacrol, germacrene D, 1,8-cineole and p-cymene were identified as major constituents.

Key Word Index

Thymus striatus var. *interruptus*, Labiatae, essential oil composition, β -caryophyllene, thymol, carvacrol, germacrene D, 1,8-cineole, p-cymene.

Plant Name

Thymus striatus Vahl var. *interruptus* Jalas (1).

Source

Aerial parts of the plant were collected from four localities:

A = Kirklareli: Karadere in May 1991

B = Kirklareli: Karahamza Village in May 1990

C = Kirklareli: Evciler Village on 13 June 1993

D = Kirklareli: Koruköy on 25 May 1994.

Voucher specimens are kept at the Herbarium of the Faculty of Pharmacy (ESSE: 9996, 8975, 10739, 10783, respectively).

Plant Part

Flowering aerial parts of the plants collected from localities A, B, C and D were subjected to hydrodistillation for 3 h using a Clevenger-type apparatus to yield oils in 0.39% (A), 0.09% (B), 1.27% (C) and 0.37% (D).

Previous Work

None.

Present Work

The oils were analyzed by GC/MS using a Hewlett-Packard GC=MSD system. Innowax FSC column

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Table I. Percentage composition of the oils of *Thymus striatus* var. *Interruptus* from four different locations in Turkey

Constituent	A	B	C	D
α -pinene	0.4	0.1	0.1	-
α -thujene	0.1	-	t	-
camphene	1.0	0.3	0.2	-
β -pinene	0.2	-	-	-
sabinene	<0.1	-	-	-
butyl benzene	<0.1	-	-	-
myrcene	<0.1	0.4	0.2	-
α -terpinene	0.4	-	0.1	-
dehydro 1,8-cineole	<0.1	-	-	-
limonene	2.1	0.8	0.7	-
1,8-cineole	10.0	0.5	3.0	-
γ -terpinene	0.3	0.2	0.3	-
5-methyl-3-heptanone	4.8	0.2	0.5	-
p-cymene	9.5	0.6	1.9	-
terpinolene	0.2	-	-	-
3-nonanone	0.2	-	-	-
3-octanol	1.2	0.2	0.4	-
nonanal	0.1	-	-	-
α ,p-dimethylstyrene	0.2	-	-	-
1-octen-3-ol	3.2	0.1	1.5	-
trans-sabinene hydrate	4.6	0.5	2.9	-
menthone	0.4	0.1	0.1	-
(Z)-3-hexenyl isovalerate	<0.1	-	-	-
α -campholenal	<0.1	-	-	-
isomenthone	0.4	1.1	0.1	-
α -copaene	-	1.7	0.6	-
camphor	2.2	1.0	1.2	1.9
β -bourbonene	0.3	0.3	0.3	-
linalool	0.9	1.7	1.8	4.2
cis-sabinene hydrate	1.2	0.1	0.9	-
octanol	0.1	0.1	0.1	-
linalyl acetate	-	-	-	3.3
1-methyl-4-acetyl-1-cyclohexene	<0.1	-	-	-
trans-p-menth-2-en-1-ol	0.4	-	t	-
pinocarvone	0.1	-	-	-
bornyl acetate	0.4	0.3	0.1	t
6-methyl-3,5-heptadien-2-one	<0.1	-	-	-
methyl thymol	0.1	-	-	0.5
terpinen-4-ol	3.9	1.1	2.9	t
β -caryophyllene	t	29.6	12.7	56.5
cis-dihydrocarvone	0.9	-	-	-
cis-p-mentha-2,8-dien-1-ol	0.5	-	-	-
dehydrosabina ketone	<0.1	-	-	-
trans-dihydrocarvone	0.9	-	-	-
1-decen-3-ol	0.1	-	-	-
pulegone	1.3	2.1	0.9	-
trans-pinocarveol	0.7	-	-	-
p-mentha-1,5-dien-8-ol	<0.1	-	-	-
trans-p-mentha-2,8-dien-1-ol	0.2	-	-	-

Table I. Continued

Constituent	A	B	C	D
thymol	10.5	4.0	34.7	1.0
(E)- β -farnesene	-	6.6	1.7	6.2
δ -terpineol	0.5	-	-	-
trans-verbenol	1.2	-	0.2	-
α -humulene	-	1.4	0.7	1.6
p-mentha-1,8-dien-4-ol	0.1	-	-	-
α -terpineol	1.6	0.6	0.8	t
γ -muurolene	-	0.3	0.7	-
borneol	7.9	2.4	2.4	-
verbenone	0.1	-	-	-
germacrene D	-	3.5	0.5	11.1
trans-p-menth-2-en-1,8-diol	0.3	-	-	-
β -bisabolene	4.4	0.6	6.4	-
carvone	0.1	-	0.4	-
bicyclogermacrene	-	0.7	-	0.8
cis-piperitol	0.1	-	-	-
δ -cadinene	-	1.8	1.5	t
γ -cadinene	0.1	-	0.6	-
cis-p-menth-2-en-1,8-diol	0.1	-	-	-
cis-sabinol	<0.1	-	-	-
cuminaldehyde	0.2	-	0.1	-
myrtenol	0.2	-	-	-
p-mentha-1(7),8-dien-2-ol*	0.1	-	-	-
trans-carveol	1.1	-	-	-
geraniol	0.1	-	-	-
calamenene*	-	-	0.1	-
p-cymen-8-ol	1.1	-	-	-
thymyl acetate	0.2	-	0.1	-
(E)-geranyl acetone	-	0.2	0.1	-
cis-carveol	0.3	-	-	-
carvacryl acetate	<0.1	-	-	-
epicubebol	-	-	0.1	-
piperitenone	-	0.1	-	-
4-isopropyl salicylaldehyde	0.6	-	-	-
cubebol	-	t	0.2	-
2-ethyl hexadecanoic acid	0.1	-	-	-
piperitenone oxide	<0.1	-	-	-
isocaryophyllene oxide	0.1	-	t	-
caryophyllene oxide	1.8	6.7	5.8	3.5
perillyl alcohol	0.2	-	-	-
norbourbonene	<0.1	-	-	-
(E)-nerolidol	-	-	-	3.3
humulene epoxide-II	-	0.2	0.1	-
octanoic acid	0.1	-	-	-
viridiflorol	-	0.3	-	-
cumin alcohol	0.3	-	-	-
hexahydrofarnesylacetone	0.3	t	-	0.4
spathulenol	-	1.7	1.7	0.5
nonanoic acid	0.4	0.7	0.3	t
T-cadinol	-	0.2	-	-

Table I. Continued

Constituent	A	B	C	D
thymol	10.5	4.0	34.7	1.0
T-muurolol	-	0.1	-	-
carvacrol	5.3	20.6	5.2	4.9
α -cadinol	-	0.3	0.2	t
cadalene	<0.1	-	-	-
decanoic acid	0.2	0.3	0.1	t
caryophylla-2(12)-6(13)-dien-5 β -ol†	-	0.3	-	-
caryophylla-2(12)-6(13)-dien-5 α -ol†	0.3	1.1	0.3	-
caryophylla-2(12)-6-dien-5 α -ol†	-	0.4	-	-
caryophylla-2(12)-6-dien-5 β -ol†	0.3	1.1	0.8	-
dodecanoic acid	0.1	0.3	0.2	0.4
phytol	<0.1	-	-	-
Total (%)	93.7	99.3	99.3	100.0

Location of samples: A = Kirklareli: Karadere in May 1991; B = Kirklareli: Karahamza Village in May 1990; C = Kirklareli: Evciler Village on 13 June 1993; D = Kirklareli: Koruköy on 25 May 1994.

†tentative identification: *caryophylla-2(12)-6(13)-dien-5 β -ol*: mw 220, C₁₅H₂₄O; KIP 2312 159(29), 136(100), 135(30), 117(23), 105(31), 91(45), 79(35), 69(35), 41(55); *caryophylla-2(12)-6(13)-dien-5 α -ol*: mw 220, C₁₅H₂₄O; KIP 2316; 177(5), 159(9), 136(100), 135(22), 117(17), 105(23), 91(36), 79(33), 69(35), 55(24), 41(48); *caryophylla-2(12)-6-dien-5 α -ol*: mw 220, C₁₅H₂₄O; KIP 2353; 187(34), 161(30), 149(46), 131(49), 123(55), 109(87), 79(77), 67(55), 55(69), 41(100); *caryophylla-2(12)-6-dien-5 β -ol*: mw 220, C₁₅H₂₄O; KIP 2392; 187(19), 177(13), 159(29), 149(36), 131(51), 121(48), 91(100), 109(69), 79(81), 69(49), 55(65), 41(89)
KIP = retention index on a polar column; *correct isomer not identified; t = trace (<0.01%)

(60 m x 0.25 mm) was used with helium as carrier gas. GC oven temperature was kept at 60°C for 10 min and programmed to 220°C at a rate of 4°C/min, and then kept constant at 220°C for 10 min and programmed to 240°C at a rate of 1°C/min. Split flow was adjusted at 50 mL/min. The injector and detector temperatures were at 250°C. MS were taken at 70 eV. Mass range was from m/z 35 to 425. Library search was carried out using Wiley GC/MS Library and TBAM Library of Essential Oil Constituents. Relative percentage amounts were calculated from TIC by the computer.

The compounds identified in the oils are listed in Table I. The four oils obtained from plants collected in different localities of the same region gave quite different compositions as follows:

A: thymol (10.5%), 1,8-cineole (9.96%), p-cymene (9.48%), carvacrol (5.28%)

B: β -caryophyllene (29.50%), carvacrol (20.59%)

C: thymol (34.7%), β -caryophyllene (12.74%), carvacrol (5.24%)

D: β -caryophyllene (56.48%), germacrene D (11.12%), carvacrol (4.85%)

Since the identities of the plant materials were checked repeatedly, any misidentification is ruled out. Except for A and C, all the other materials showed β -caryophyllene as the major constituent. Carvacrol (20.59%) was present in good amount in the oil of B. In A, however, high percentages of 1,8-cineole (10%) and p-cymene (9.5%) were significant. This oil contained only a trace amount of β -caryophyllene. Four isomeric caryophyllene alcohols were detected in the oil B. The results clearly indicate that the oil of *T. striatus* var. *interruptus* has no consistency and we can safely suggest that there are at least three chemotypes, namely thymol/1,8-cineole/p-cymene-type; thymol/ β -caryophyllene-type; and β -caryophyllene-type, of this species.

Acknowledgment

The authors thank Dr. Hayri Duman of Gazi University, Ankara, Turkey for the authentication of plant materials.

Reference

1. P. H. Davis, *Flora of Turkey and the East Aegean Islands*. Vol. 7, pp 362,363, University Press, Edinburgh (1982).