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Chemical composition of the essential of *Thymus numidicus* Poiret

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ABSTRACT

The essential oil of Thymus numidicus Poiret an endemic Algerian species was obtained by steam distillation and identified by GC and GC-MS. 48 components were determined. The oxygenated terpenoidic components constituted the most important fraction (71.7%) while the non oxygenated fraction represented 26.2%. The major components were thymol (54.1%) followed by p-cymene (15,3%), linalool (5.4%) , carvacrol (3.8%), thymoquinone (3.7%) , α-pinene (2%), thymol methylether (1.7%) and β-caryophyllene (1.8%). Our result differ slightly from the few previous studies on this species and showed a relatively high proportion of p-cymene 15.3%) , α-pinene (2%) and hydrocarbonated sesquiterpenic fraction (4.6%) in comparison with the other samples studied previously

Keywords: *Thymus numidicus* Poir. Lamiaceae, essential oil, Thymol, Carvacrol, Linalool, p-Cymene, Thymoquinone,

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INTRODUCTION

The genus thymus belonging to the tribe Mentheae of the Lamiaceae family comprises about 350 species predominantly found in the Mediterranean region, Asia, Southern Europe and North Africa [1] among which 13 species are growing in the north of Algeria [2] . Several thymus species are used as herbal teas condiments and spices and for various medicinal purposes [3]. A wide range of biological and pharmacological properties have been reported for this genus such as antiseptic, antitussive, expectorant, antispasmodic, anthelminthic and anti inflammatory [4-6]. There are several ecotype of thyme which differ in their morphological aspects in the composition of their essential oils. In this paper as a continuation of our research on Algerian medicinal plants [7-10], we report the essential oil of the aerial parts of *Thymus numidicus* Poiret. These results differ slightly from those reported previously on this species [11-13].

MATERIALS AND METHODS

Plant material

The aerial parts of *Thymus numidicus* Poir. were Collected in March 2012 in the area of Constantine (North of Algeria). Voucher specimen was deposited at the herbarium of the reseach unity VARENBIOMOL of the university of Constantine.

Essential Oil extraction

The aerial parts of T. Numidicus were steam distilled in a Kaiser-Lang apparatus (2 hours).

GC-FID Analysis

The essential oils were analyzed on an Agilent gas chromatograph (GC-FID) Model 6890, equipped with a HP-5 ms fused silica capillary column (5%-diphenyl-95%-dimethylpolysiloxane (25 m x 0.25 mm, film thickness 0.25 µm), programmed from 50°C (5 min) to 250 °C at 3°/min and held for 10 min. Injector and flame ionization detector temperatures were 280 and 300 °C, respectively. The essential oils were diluted in acetone in 3.5% (v/v) and 1 µl was injected in split mode (1/60), helium was used as a carrier gas (1.0 mL/min). The proportions of the identified compounds were calculated by internal normalization.

GC-MS Analysis

Mass spectrometry was performed on an Agilent gas chromatograph-mass spectrometer (GC-MS) Model 7890/5975, equipped with HP-5 capillary column (25 m x 0.25 mm, film thickness 0.25 µm) programmed with the same conditions as for GC-FID. The mass spectrometer (MS) ionization was set in positive electron impact mode at 70 eV and electron multiplier was set at 2200 V. Ion source and MS quadrupole temperatures were 230°C and 180°C, respectively. Mass spectral data were acquired in the scan mode in the *m/z* range 33-450. The essential oils constituents were identified by matching their mass spectra and retention indices (RI) with those of reference compounds from libraries [14,15].

RESULTS AND DISCUSSION

Chemical composition of the essential Oil

Fourty six compounds were determined in the essential oil of *Thymus numidicus* representing 96.5 % of the total oil content. The main constituent of the oil were found to be : thymol (54.1%) followed by p-cymene (15,3%), linalool (5.4%) , carvacrol (3.8%), thymoquinone (3.7%) , α -pinene (2%), thymol methylether (1.7%) and β-caryophyllene (1.8%).

The oxygenated terpenoidic components constituted the most important fraction (71.7%) among which thymol (54.1%), linalool (5.4%) carvacrol (3.8%) and thymoquinone (3.7%) represented the fingerprint of this sample from the Constantine region of Algeria. It is interesting to notice that the two other samples studied previously from this region did not contain linalool and thymoquinone for the first sample and did not contain carvacrol associated with less content of thymol for the second. Our sample seems to be closer to the sample studied by Hadef et al from the region of Souk Ahras which contained high proportions of thymol (57.2%) , linalool (9.2%) carvacrol (2.2%) and p-cymen (7.5%).

Our sample is also distinguished from the previous samples by a relatively high level of the hydrocarbonated sesquiterpenic fraction (4.6%) in comparison with the other samples studied previously [11-13].

Table 1

Pics	Components	RI	%
1	α thujene	931	0,7
2	α pinene	939	2,0
3	Camphene	953	0,1
4	β pinene	980	0,1
5	Octene-3-ol	978	0,8
6	octanone-3	984	0,1
7	Myrcene	991	0,5
8	Octanol-3	993	0,1
9	α-Phellandrène	1005	0,1
10	Δ-3-Carene	1011	0,1
11	α-Terpinene	1018	0,6
12	p-Cymene	1026	15,3
13	Limonene	1031	0,6
14	β-Phellandrene	1031	0,2
15	γ-Terpinene	1062	0,3
16	Cis-Sabinene hydrate	1068	0,5
17	Terpinolene	1088	0,1
18	p-Cymenene	1089	0,1
19	Linalol	1099	5,4
20	Borneol	1165	0,1
21	Terpinene-4-ol	1182	0,3
22	paracymene-8-ol	1197	0,1
23	α-Terpineol	1278	0,1
24	Trans-Dihydrocarvone	1208	0,1
25	Thymol-methyl ether	1235	1,7

26	Thymoquinone	1249	3,7
27	Thymol-methyl ether	1290	54,1
28	Carvacrol	1298	3,8
29	α-Copaene	1379	0,1
30	β-Bourbonene	1384	0,2
31	β Caryophylene	1418	1,8
32	β-Copaene	1430	0,1
33	α-Humulene	1454	0,1
34	γ-Muurolene	1477	0,3
35	Germacrene D	1480	0,1
36	β-selinene	1486	0,1
37	Valencene	1494	0,1
38	β-Bisabolene	1509	0,7
39	γ-Cadinene	1510	0,2
40	Δ-Cadinene	1520	0,3
41	Cis-Calamenene	1521	0,1
42	α-Bisabolene	1530	0,1
43	Thymohydroquinone	1553	0,2
44	Caryophyllene oxide	1581	0,5
47	Cadalene	1674	0,1
48	Isoeugenol	1675	0,1
		Total	96.9
	Terpenoidic oxygenated compounds		71.7
	Non oxygenated terpenoidic compounds		26.2
	Hydrocarbonated sesquiterpenic fraction		4.6

CONCLUSION

The chemical composition of the essential oil of *Thymus numidicus* was described and compared to the few previous studies related to this specices. Fourty six components were determined. The oxygenated terpenoidic compounds constituted the most abundant fraction (71.7%). The major constituents were : thymol (54.1%) followed by p-cymene (15,3%), linalool (5.4%) , carvacrol (3.8%), thymoquinone (3.7%) , α -pinene (2%), thymol methylether (1.7%) and β-caryophyllene (1.8%). These results are slightly different from the previous studies reported concerning this species , this may be explained by the presence of several chemotype for this species. Our chemotype is characterized by high level of thymol, p-cymene, linalool , carvacrol thymoquinone and thymol methyl ether. Our sample is also characterized by a relatively high content of the sesquiterpenic fraction (4.6%).

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