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Essential oil Composition of *Thymelea microphylla* Coss et Dur.

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ABSTRACT

Essential oil components of the aerial parts of *Thymelea microphylla* Coss et Dur. have been studied by gas chromatography-mass spectrometry to afford 11 components. The major components were found to be: D-menthone (41.86 %), 2-Undecanone (23.74 %), Pulegone(11.94%) and Perillal (9.34 %). Some other compounds were only present in minor amounts. In total, volatile oil composition of *Thymelea microphylla* Coss et Dur. was considered as a rich source of oxygenated monoterpenes .

Key words: *Thymelea microphylla* Coss. et Dur., Essential oil, GC-MS.

INTRODUCTION

Essential oils are secondary metabolites that plants usually synthesize to combat infectious or parasitic agents or generate in response to stress conditions. Essential oils are aromatic components obtained from different plant parts. They are important natural products used for their flavour and fragrances in food, pharmaceutical and perfumery industries. They are also sources of aroma chemicals, particularly of enantiomers and useful chiral building blocks in syntheses [3].

The investigation of essential oil of all species belonging to the Thymeleaceae family is very poor especially the genus *Thymelea*.

Thymelea is a Mediterranean genus belonging to a primarily tropical and subtropical family. This genus is here presented as a particular case on which the hypothesis of an in situ evolution of the Mediterranean flora from a Tertiary subtropical stock can be phylogenetically tested.

Thymelea Mill. comprises 31 species [2]. In Algeria it is represented by 7 species one of which named *Thymelea microphyla* Coss et Dur. (Endemic plant) [1].

Thymelea species are reported to be medicinal plants in the literature as well as in folklore, and their medicinal values are well documented. Their properties are attributed to a variety of active phytochemical constituents. Many flavonoids and coumarins have been isolated from various species [4].

The present work deals with the chemical composition of the hydrodistilled oils obtained from the aerial parts of the Algerian *Thymelea microphyla* Coss. et Dur., previously not investigated. Nonetheless, some studies have been reported on the species *Thymelea* where, Odeh *et al.* (2007) investigated the volatile components of *Thymelea hirsuta* and identified the major components as hexanol, nonanal, decanal, benzaldehyde, 3,7- dimethyl-1,6-octadien-3-ol, nonanal, 9 – benzyl alcohol, dodecanal, tetradecane , phenylethyl alcohol [5]. Another study has been carried out on the antifungal activity of *Thymelea lythroides* extract [6].

MATERIALS AND METHODS

Plant material

The aerial parts of *Thymelea microphyla* Coss. et Dur. were collected in March 2008 (flowering stage) in Ouargla, Algeria. The plant was identified by Dr. Chahma A. M. university of Ouargla,. A voucher specimen was deposited at the chemistry Department University of Mentouri-Constantine under the code number ZA 107.

Extraction

Essential oils were obtained by hydrodistillation of 100g of dried fruits using a Clevenger-type apparatus for 3 h. diethyl ether (10 ml) was used as the collector solvent as reported in literature. After evaporation of the solvent, the oil was dried over anhydrous sodium sulphate and stored in sealed vials protected from the light at -20°C before analyses to afford 0.02 g (02 %) of crude oil. The oil sample was subsequently analyzed by GC-MS .

Identification of components

Gas Chromatography/Mass Spectroscopy.

Gas chromatography/mass spectrometry (GC/MS)

The oil was analyzed by GC/MS using a Agilent 5973EI mass selective detector coupled with an Agilent GC6890A gas chromatograph, equipped with a cross-linked 5% PH ME siloxane HP-5MS capillary column (30 m · 0.25 mm · film thickness 0.25 μm). Operating conditions: The carrier gas flow was 1.6 ml He/min, column pressure was 100 Kpa. The injector and detector temperatures were 220°C and 250°C respectively. The column temperature was held at 60°C for 1 min, then raised from 60°C to 200°C at $10^{\circ}\text{C}/\text{min}$ and held there for 5 min and from 200°C to 240°C at $10^{\circ}\text{C}/\text{min}$ and held there for 6 min. The program was run in the splitless mode with a mass range of 50–400 u, and the scan interval was 0.5 s. Detector voltage was set at 1.5 kV.

Identification of components

Identification of oil components was achieved on the basis of their retention indices RI, (determined with reference to a homologous series of normal alkanes), and by comparison of their mass spectral fragmentation patterns with those reported in the literature [7] and stored on the MS library (NIST database). The concentration of the identified compounds was computed from the GC peak total area without any correction factor.

RESULTS AND DISCUSSION

Prior to carrying out the hydrodistillation, a phytoscreening study has been conducted focussing on 7 chemical groups. The results revealed the presence of essential oil, flavonoids, saponins, tannins, and Coumarins, not previously reported in the literature (Table:1).

Table 1 : Phytochemical survey from *Thymelea microphyla* Coss et Dur.

Chemical Groups	R	L	St	Fl	F&S
Volatile oils	-	++	++	+	+
Alkaloids	-	-	-	-	-
Flavone Aglycone	-	+	+	+	+
Coumarins	++	+++	+++	+++	+++
tanins	+	++	++	++	+
Saponins	--	--	--	--	-
Flavone glycoside	-	+++	++	+++	++

(+) present, (++) present, (+++) present, (±) Traces, (-) absent

R:Roots, L : Leaves, St : Steams, Fl : Flowers, F&S: Fruits and Seeds

The GC analysis identified 11 compounds representing 100 % of the total volatile content. The major components were found to be: D-menthone (41.86 %), 2-Undecanone (23.74 %), Pulegone (11.94%) and Perillal (9.34 %). some other compounds were only present in minor amounts. The oil composition is dominated by the Monoterpenes (67.84 %) dominated by oxygenated compounds (62.94%). Among the sesquiterpenes, oxygenated compounds represent the whole content (1.54 %).

Table 2: Essential oil composition from *Thymelea microphyla* Coss et Dur.

Chemical constituents	Essential oil	Rt	%
1-carboxylic acid bornane		2.634	3.88
Limonene	Hydrocarbon monoterpene	9.695	1.92
isobutyranilide		10.376	0.58
D-menthone	Oxygenated monoterpene	16.432	41.86
Pulegone	Oxygenated monoterpene	21.006	11.74
(6E)-2,5-Dimethyl-1,6-	Hydrocarbon monoterpene	21.784	1.40
Perillal	Oxygenated monoterpene	22.876	9.34
2-Undecanone		25.649	23.94
(Z,E)- α -Farnesene	Hydrocarbon sesquiterpene	33.018	1.54
1-(2-Bromovinyl)-adamantane		36.556	2.15
Artemesiatriene	Hydrocarbon monoterpene	37.494	1.66

Table 3: main class and subclasses of essential oil components of *Thymelea microphyla* Coss et Dur.

Hydrocarbon Monoterpenes	4,92
Oxygenated Monoterpenes	62,94
Sesquiterpenes	1,54
Others	30,55

CONCLUSION

Based on the above study, it may be summarized that the flowering aerial parts of *Thymelea microphyla* Coss et Dur. may be utilized for separation of the essential oil and a source of Oxygenated monoterpenes.

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