

CONSTITUTION OF THE ESSENTIAL OIL FROM AN *ARTEMISIA HERBA-ALBA* POPULATION OF SPAIN

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Key Word Index—*Artemisia herba-alba*: Compositae; essential oil.

Abstract—The composition of the essential oil from a Spanish population of *Artemisia herba-alba* has been compared with that of Israeli populations of the same plant. The chemotaxonomic affinity of the two populations was not reflected in the compositions of the oils.

INTRODUCTION

Artemisia herba-alba Asso, a plant much used in folk medicine, is a widely distributed species with a high diversity of chemotypes [1-8]. The type specimen of this species originated in Spain [9]. We therefore sampled a population in Aranjuez, Spain, in order to compare several phytochemical constituents with populations growing in Israel.

As the essential oils are most probably the constituents responsible for the therapeutic properties of this plant [10], we isolated the oil from the Spanish population and compared its composition with that of the Israeli chemotypes.

RESULTS AND DISCUSSION

The essential oil was obtained in about the same yield as the oils from the Israeli *A. herba-alba* populations [5]. Analyses were performed as described before [5]. Table 1 summarizes the constituents, their relative amounts and the mode of their identification.

Previously it has been shown that 1,8-cineole and derivatives of the thujane and bornane skeletons characterize most species of the *Artemisia* genus [11, 12].

The Spanish *A. herba-alba* oil fits this pattern by containing large amounts of 1,8-cineole and bornane derivatives [13]. In contrast to the Israeli [5] and Moroccan chemotypes [7] it lacks significant quantities of thujane derivatives. It contains large amounts of sesquiterpenes, some of which were also found in the oil of a population derived from Spain (Valentia) [13] and in the Sinai chemotype [5].

The oil of *A. herba-alba* from Aranjuez has none of the constituents typical for various chemotypes investigated, i.e. the irregular monoterpenes which characterize the *A. herba-alba* populations from the Negev (Israel) [5, 14], or high concentrations of *cis*-chrysanthenyl acetate or davanome typical for the Moroccan chemotypes [8].

The antibacterial potency of the Spanish oil was investigated. Its activity pattern did not deviate from that observed for the Israel populations [10]. Considerable

Table 1. Composition (%) of the essential oils of *A. herba-alba* collected at Aranjuez

	(%)	Mode of identification
Monocyclic monoterpenes		
α -Terpineol	6.3	A, B
α -Terpinene	0.3	D
<i>p</i> -Cymene	3.9	A
α -Terpinene	1.8	D
Terpinen-4-ol	4.8	B
<i>p</i> -Cymen-8-ol	0.5	D
Piperitol	0.5	C
Cumin aldehyde	0.6	D
Terpenyl acetate	0.4	C
1,8-Cineole	13.3	A
Terpinolene	traces	D
β -Terpineol	"	D
Piperitone	"	C
Thymol	"	A
Total	32.3	
Monoterpenes with thujane skeleton		
<i>trans</i> -Sabinenehydrate	0.4	B
Monoterpenes with bornane skeleton		
Camphor	15.0	A
Camphene	1.9	A, C
Borneol	4.8	A, C
Bornyl acetate	0.3	C
Bornyl propionate	2.6	D
Total	34.6	
Monoterpenes with pinane skeleton		
α -Pinene	1.7	C
β -Pinene	0.8	C
Chrysanthenone	4.5	D
Myrtenol	traces	D
Total	7.0	
Sesquiterpenes		
Caryophyllene	0.7	C
α -Guaiene or β -cubebene	6.0	D
β -Elemenene	2.7	D, C

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Table 1. *Continued*

	(%)	Mode of identification
δ -Cadinen	0.7	D
α -Humulene	small quantities	C
α -Cedrene	" "	D
β -Bisabolene	" "	D
<i>trans</i> - β -Farnesene	" "	D
α -Guainene	" "	D
β -Guainene	" "	D
Curcumene	" "	D
Unidentified	11%	
Total	21.1	

A: Purified compound identified by comparison with authentic sample. B: Purified compound identified by comparison of spectroscopic data with literature data. C: Identified by comparison of GC/MS data with those of authentic sample. D: Identified by comparison of GC/MS data with literature data.

inhibition of the growth of *Shigella-sonnei* and *Staphylococcus aureus* was observed, while no inhibition of *Escherichia coli* took place.

This investigation shows that the composition of the oil from Aranjuez does not indicate the chemotaxonomic affinity of the Israeli and Spanish populations.

EXPERIMENTAL

The plant material was collected in December 1980 on hills near Aranjuez, Spain. The essential oil was obtained by steam distillation of the crushed leaves in 0.6% yield of the air dried material. $n_D = 1.4545$; $[\alpha]_D^{22} - 10.5^\circ$ $d = 0.8638$. The colourless oil was stored at -20° under N_2 .

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