# VOLATILE CONSTITUENTS OF *TEUCRIUM POLIUM*

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*Teucrium polium* L. (Labiatae) is a dwarf, pubescent, aromatic shrub, possessing oval leaves with inrolled margins and dense heads of white flowers. It is widespread in the dry and stony places of Greeece and almost all Mediterranean countries. Its essential oil has been scarcely studied; only two publications refer to its composition (1, 2). Twelve major and about thirty minor compounds have been reported by Wassel and Ahmed (1); from those identified, α-pinene, ocimene, menthane, and pulegone belong to the major ones and myrcene and menthofuran to the minor ones. Hassan *et al.*(2), found ten major compounds, those identified being β-pinene, limonene, α-phellandrene, linalool, terpinen-4-ol, γ-cadinene, δ-cadinene, guaiol, and cedrol. The disparity of the above results, as well as the lack of a more detailed analysis of *T. polium* volatile oil, have motivated our study.

The essential oil of *T. polium*, separated by hydrodistillation and by $Et_2O$-pentane extraction, was analyzed by gc/ms (Tables 1 and 2). In both cases, most of the compounds identified are sesquiterpenes; among them, the oxygenated ones are more numerous in the $Et_2O$-pentane extract. However, a significant number of sesquiterpenes present in the hydrodistilled oil are absent in the $Et_2O$-pentane-extracted oil, whereas quite the contrary holds for several straight-chain paraffins ($C_{11}$-$C_{16}$).

TABLE 1. Analysis of *Teucrium polium*, Essential Oil

| Rt[a] | Identification | % | Rt[a] | Identification | % |
|---|---|---|---|---|---|
| 5 56 | α-pinene | 0.4 | 25 51 | carvacrol | 0.5 |
| 7 55 | β-pinene | 0.5 | 26 33 | *trans*-carvyl acetate | 1.8 |
| 9 08 | myrcene | 0.4 | 28 26 | α-copaene | 2.0 |
| 10 25 | *p*-cymene | 0.4 | 28 38 | β-bourbonene | 0.8 |
| 10 37 | 1,8 cineole | 0.4 | 31 11 | β-caryophyllene | 7.7 |
| 10 49 | limonene | 0.4 | 32 39 | α-humulene | 3.7 |
| 14 55 | linalool | 1.3 | 33 34 | ϵ-muurolene | 1.6 |
| 15 19 | eucarvone | 0.7 | 33 50 | α-curcumene | 1.3 |
| 16 37 | *trans*-pinocarveol | 1.6 | 34 13 | alloaromadendrene | 0.6 |
| 17 07 | sabinaketone | 1.2 | 34 28 | α-muurolene | 0.6 |
| 17 34 | *trans*-verbenol | 3.0 | 35 28 | γ-cadinene | 3.0 |
| 18 24 | borneol | 0.4 | 36 18 | δ-cadinene | 1.7 |
| 19 06 | terpinen-4-ol | 0.8 | 36 24 | δ-calacorene | 0.5 |
| 19 44 | myrtenal | 1.1 | 36 32 | α-bisabolene | 0.5 |
| 19 56 | verbenone | 0.7 | 36 54 | β-calacorene | 0.4 |
| 20 23 | myrtenol | 1.8 | 39 36 | caryophyllene oxide | 5.9 |
| 21 21 | *trans*-carveol | 0.4 | 43 11 | τ-cadinol | 9.3 |
| 21 52 | carvone | 0.4 | 43 35 | α-cadinol | 5.4 |
| 24 45 | *p*-cymen-7-ol | 0.4 | | | |

[a]Retention time.

The composition of the *T. polium* volatile oil we analyzed resembles that reported by Hassan *et al.* (2), though some compounds found by these authors, such as α-phellandrene, guaiol, and cedrol, could not be detected by us. On the other hand, our results have no resemblance at all to those obtained by Wassel and Ahmed (1). These dissimilarities may be considered as an indication of several chemical races existing within the species.

## EXPERIMENTAL

The plant material was collected from Mt. Hymettus, near Athens (Greece), on calcareous soil, at ele-

TABLE 2. Analysis of the Volatile Fraction of the $Et_2O$-Pentane Extract of *Teucrium polium*

| Rt[a] | Identification | % | Rt[a] | Identification | % |
|---|---|---|---|---|---|
| 8 14 | β-pinene | 2.1 | 22 20 | carvone | 0.4 |
| 9 20 | myrcene | 0.8 | 25 15 | bornyl acetate | 0.5 |
| 10 45 | *p*-cymene | 1.7 | 25 22 | *p*-cymen-7-ol | 0.7 |
| 11 16 | limonene | 0.5 | 27 11 | *trans*-carvyl acetate | 1.0 |
| 13 32 | *cis*-linalyl oxide | 0.6 | 22 20 | tridecane | 2.2 |
| 14 22 | *trans*-linalyl oxide | 0.7 | 30 14 | α-copaene | 1.6 |
| 15 01 | linalool | 0.5 | 30 29 | β-bourbonene | 1.1 |
| 15 44 | eucarvone | 0.9 | 31 59 | β-caryophyllene | 0.7 |
| 16 39 | undecane | 7.5 | 32 10 | tetradecane | 1.7 |
| 17 02 | *trans*-pinacarveol | 1.7 | 33 49 | α-humulene | 0.7 |
| 17 21 | sabinaketone | 1.3 | 34 42 | α-muurolene | 0.8 |
| 17 33 | *trans*-verbenol | 1.6 | 36 19 | ϵ-cadinene | 3.5 |
| 17 48 | pinocarvone | 1.0 | 36 42 | pentadecane | 0.6 |
| 19 32 | terpinen-4-ol | 0.9 | 38 50 | caryophyllene oxide | 9.0 |
| 19 37 | myrtenal | 1.2 | 41 02 | hexadecane | 1.6 |
| 20 20 | verbenone | 1.7 | 41 37 | T-cadinol | 10.8 |
| 20 31 | myrtenol | 1.4 | 42 00 | α-cadinol | 7.8 |
| 22 16 | dodecane | 3.0 | | | |

[a]Retention time.

vation 350 m, in the begining of May 1981, at the time of flowering. A specimen of *T. polium* is deposited in the Herbarium of the Division of Botany, Department of Biology, University of Thessaloniki, Greece.

After air-drying, the leaves and flowering heads were separated from the branches and distilled in a Clevenger apparatus for 3.5 h. The yield was 1.1% dry weight. The essential oil, separated by extraction with pentane, represents 0.7% of the dry plant material. Extraction in a Soxhlet with $Et_2O$ yielded 1.2% of products soluble in pentane. Both the essential oil separated by hydrodistillation and the $Et_2P$-pentane extract were analyzed by gc/ms.

Both a polar (Carbowax 20M) and a non-polar column (SE 30) were preliminarily used. The gc/ms analysis was further conducted with SE 30 capillary columns, 25 m, WCOT. The temperature program adopted for the $Et_2O$-pentane extract was 60° for 5 min, followed by an increase at 3° per min to 170°, and for the essential oil (by hydrodistillation) 50° for 5 min, followed by an increase at 3° per min to 180°. The carrier gas was $N_2$ with a flow rate of 5 cm/sec. The ms were determined at 70 eV. The individual compounds were identified by comparing their ms and their rt's to those of authentic samples, already available in the literature (3-5).

## LITERATURE CITED

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