*Chemistry of Natural Compounds, Vol. 33, No. 3, 1997*

# ESSENTIAL OIL OF *Perovskia scrophulariifolia**

**Kh. R. Nuriddinov,[a] K. Kh. Khodzimatov,[b] Kh. N. Aripov,[a]**
**T. Ozek,[c] B. Demirchakmak,[c] and K. H. C. Basher[c]**

*The herbal parts of* Perovskia scrophulariifolia *(Labiatae) collected from Yakkabag in the Kashkadarya region of Uzbekistan in August, 1993 yielded 0.54% oil by water distillation. The oil was analyzed by GC/MS. Seventy-one components were characterized representing 95% of the oil with 1,8-cineole (11%), caryophyllene oxide (10%), camphor (9%), humulene epoxide II (7.9%), bornyl acetate (7.8%), and p-cymene (5.7%) as major constituents.*

The genus *Perovskia* (Labiatae) is represented in the flora of the former USSR by six species which are distributed in Central Asia, North Iran, Beluchistan, Afghanistan, West Tibet, and West India [1].

Constituents of the essential oil of the aerial parts of *P. scrophulariifolia* growing in Turkmenistan were reported as borneol, camphene, geraniol, linalool, β-pinene, sabinene, terpinene, and terpinolene without quantitative indication [2]. In a separate study, 0.2-2.1% essential oil was obtained from herbal parts of the plants growing in Tyanshan, Fergana, Pamir-Alay, and Zarafshan mountains. Major constituents found in the oils were as follows: 1,8-cineole (15-19%), camphene (3.7-6.2%), δ-3-carene (4-6.5%), linalool (3-7.2%), linalylacetate (7.9-8.4%), humulene (5-7.7%), α-betulenol (4-6.7%), β-caryophyllene (7-13%), and α-pinene (8-12%) [3].

We have analyzed the essential oil of *Perovskia scrophulariifolia* Bunge occurring in Uzbekistan. The hydrodistillated essential oil was analyzed by GC/MS and the results are given in Table 1. Seventy-one components were characterized representing 95% of the oil. 1,8-Cineole, caryophyllene oxide, camphor, humulene epoxide II, bornyl acetate, and p-cymene were found as major constituents.

## EXPERIMENTAL

The plant material was collected from Yakkabag in Kashkadarya region of Uzbekistan in August, 1993. The herbal parts were subjected to hydrodistillation for 3 h using a Clevenger-type apparatus to produce essential oil in 0.54% yield.

The essential oils were analyzed by GC/MS using a Hewlett-Packard GCD system. An Innowax FSC column (60 m × 0.25 mm ∅) was used with helium as carrier gas. GC oven temperature was kept at 60° 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. Split ratio was adjusted at 50:1. The injector temperature was 250°C. MS were taken at 70 eV. Mass range was from m/z 10 to 425. A library search was carried out using the Wiley GC/MS Library and the TBAM Library of Essential Oil Constituents [4-9]. Relative percentage amounts of the separated compounds were calculated from total ion chromatograms by the computerized integrator.

*Materials presented at the 2nd International Conference of Natural Compounds.

[a]Institute of the Chemistry of Plant Substances, Academy of Sciences, Tashkent, Uzbekistan.
[b]Institute of Botany, Academy of Sciences, Tashkent, Uzbekistan.
[c]Centre (TBAM), 26470 Eskisehir, Turkey.

Published in Khimiya Prirodnykh Soedinenii, No. 3, pp. 389-391, May-June, 1997. Original article submitted November 4, 1996.

0009-3130/97/3303-0299$18.00 ©1997 Plenum Publishing Corporation

TABLE 1. Composition of the Essential Oil of *Perovskia scrophulariifolia*

| Compounds | Amounts, % | Compounds | Amounts, % | Compounds | Amounts, % |
|---|---|---|---|---|---|
| α-pinene | 1.43 | p-cymen-8-ol | 0.32 | thujol | 0.30 |
| α-thujene | 0.10 | α-calacorene I | 0.14 | α-muurolene | 0.79 |
| camphene | 1.25 | piperitenone | 0.97 | α-selinene | 0.16 |
| β-pinene | 1.41 | cubebol | 0.08 | isocaryophyllene oxide | 1.75 |
| sabinene | 0.09 | cis-jasmone | 0.14 | **caryophyllene oxide** | **9.98** |
| δ-3-carene | 1.22 | α-calacorene II | 0.07 | humulene epoxide I | 0.54 |
| myrcene | 0.18 | α-gurjunene | 0.30 | **humulene epoxide II** | **7.85** |
| limonene | 2.79 | linalool | 0.54 | elemenal* | 0.45 |
| **1,8-cineole** | **11.0** | cis-sabinenehydrate | 0.07 | 1-epi-cubenol | 0.10 |
| **p-cymene** | **5.71** | linalylacetate | 0.27 | viridiflorol | 0.57 |
| α-p-dimethyl styrene | 0.01 | pinocarvone | 0.09 | cumin alcohol | 0.13 |
| α-cubebene | 0.19 | **bornyl acetate** | **7.82** | cis-p-menth-3-en-1,2-diol | 0.09 |
| trans-sabinenehydrate | 0.15 | β-caryophyllene | 0,72 | T-cadinol | 0.42 |
| α-copaene | 0.69 | terpinen-4-ol | 0.54 | T-muurolol | 0.20 |
| **camphor** | **9.10** | cis-p-mentha-2,8-dien-1-ol | 0.11 | α-bisabolol | 0.91 |
| carvone | 0.12 | myrtenal | 0.11 | carvacrol | 0.15 |
| geranylacetate | 1.49 | aromadendrene | 0.29 | α-eudesmol | 0.22 |
| δ-cadinene | 0.22 | trans-pinocarveol | 0.29 | α-cadinol | 0.77 |
| γ-cadinene | 1.32 | δ-terpineol | 0.48 | caryophylladienol* | 0.84 |
| selina-3,7(11)-dien | 0.29 | α-humulene | 1.80 | calacorene alcohol I* | 0.26 |
| myrtenol | 0.32 | cryptone | 0.44 | calacorene alcohol II* | 0.22 |
| trans-carveol | 0.16 | γ-muurolene | 0.48 | caryophyllenol II | 0.62 |
| calamenene | 0.43 | α-terpinylacetate | 4.56 | epi-13-manool | 2.57 |
| m-cymen-8-ol | 0.24 | borneol | 2.81 | | |

*Tentative identification by GC/MS data alone.

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