ESTERS FROM THE ROOTS OF Ferula kyzylkumica AND F. karategina

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The species Ferula kyzylkumica and F. karategina belong to the subgenus or section Peucedanoides [1], for the majority of representatives of which the presence of esters of terpene alcohols and organic acids is characteristic. Our investigations have shown that terpenoids of precisely this type are characteristic for both species.

Roots of . kyzylkumica Korov., which have not previously been investigated chemically, were collected ... the outliers of the mountains of Tamdy-Tau in the Kyzylkum (Navoi province, Uzbekistan). Ethanolic extraction of the comminuted roots gave the total extractive substances, which were separated into phenolic, acidic, and neutral fractions by treatment with solutions of sodium carbonate and caustic potash.

The phenolic fraction was deposited on a 4 × 120 cm column of KSK silica gel. The substances were eluted with hexane–ethyl acetate, first in a ratio of 9:1 and then with increasing concentration of ethyl acetate, 100-ml fractions being collected. Five substances of ester nature were isolated:

substance (I), $C_{23}H_{32}O_6$, m.p. 140-141°C, $[\alpha]_D$ −97.9° (c 1.0; chloroform);

substance (II), $C_{22}H_{30}O_4$, m.p. 189-190°C, $[\alpha]_D$ −91.6° (c 1.0; chloroform);

substance (III), $C_{23}H_{30}O_4$, m.p. 152-154°C, $[\alpha]_D$ +89.2° (c 1.0); chloroform);

substance (IV), $C_{22}H_{28}O_3$, m.p. 144-145°C, $[\alpha]_D$ +122.9° (c 1.0); chloroform);

substance (V), $C_{17}H_{22}O_3$, m.p. 155-156°C, $[\alpha]_D$ −42° (c 1.0); chloroform).

Substances (I)-(V) were identified, from their physicochemical constants and spectral characteristics and by a direct comparison with authentic specimens, as chimganidin, ferolin [2, 4], microferin, microferinin [4, 5], and ℓ-chimgin [2], respectively. Some of these substances – chimganidin, ferolin, and ℓ-chimgin – are fairly common in the Peucedanoides section, but microferin and microferinin have a narrow specificity, having been isolated previously only from F. ovina [including F. miroccarpa]. It is obvious that in its chemical composition Ferulka kyzylkumica is in fact closest to F. ovina.

Roots of F. kartegina Lipsky ex Korov. were collected on the southern slope of the Alai range between the villages of Achikalma and Lichik-Karamyk in the valley of R. Kyzylsu in eastern Tadzhikistan close to the boundary with Kyrgyzstan. Ethanolic extraction of the roots gave the total extractive substances, which were separated into phenolic, acidic, and neutral fractions.

Separation of the phenolic fraction on a column (4 × 400 cm) of KSK silica gel with elution by chloroform-hexane, first in a ratio of 1:9 and then with increasing concentrations of chloroform, led to the isolation of four substances of ester nature – ferolin, chimganidin [2, 4], ℓ-chimgin, and chimganin [6], which were identified from their IR spectra by a direct comparison with authentic specimens.

The composition of the terpenoids of the roots of E. karategina coincided with that of the roots of F. tschimganica studied previously [3, 6], which confirms the closeness of the two species already established by E. P. Korovin [1]. Our investigations did not confirm angrendiol as an indicator of the species [7].

LITERATURE CITED

1. E. P. Korovin, Illustrated Monograph of the Genus Ferula (Tourn.) L. [in Russian], Tashkent (1947).

Institute of Chemistry of Plant Substances, Uzbekistan Academy of Sciences, Tashkent. Botanical Garden of Moscow State University. Translated from Khimiya Prirodnykh Soedinenii, No. 2, pp. 301-303, March-April, 1993. Original article submitted May 18, 1992.

0009-3130/93/2902-0253$12.50

2. T. Kh. Khasanov, A. I. Saidkhodzhaev, and G. K. Nikonov, Khim. Prir. Soedin., 807-808 (1972).
3. A. Sh. Kadyrov, T. Kh. Khasanov, A. I. Saidkhodzhaev, and G. K. Nikonov, Khim. Prir. Soedin., 808-809 (1972).
4. A. I. Saidkhodzhaev, N. D. Abdullaev, T. Kh. Khasanov, G. K. Nikonov, and M. R. Yagudaev, Khim. Prir. Soedin., 519-525 (1977).
5. L. A. Golovina, T. Kh. Khasanov, A. I. Saidkhodzhaev, V. M. Malikov, and U. Rakhmankulov, Khim. Prir. Soedin., 566-570 (1978).
6. A. Sh. Kadyrov and G. K. Nikonov, Khim. Prir. Soedin., 72-76 (1972).
7. N. P. Kir'yalov, Plants of the Family Umbelliderae as Sources of Biologically Active Substances [in Russian], Leningrad (1968), p. 129.

ESSENTIAL OIL OF Artemisia lagopus

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Samples of the essential oil for analysis were obtained by steam distillation from the epigeal part of Artemisia lagopus L. gathered in the flowering phase in Okhotia, Ayano-Maiskii region, in the Topko mountain mass if at 900 m above sea level. The period of collection was August.

The oil consisted of a light, mobile, clear, light yellow liquid with a specific pleasant and attractive odor and a burning taste. The yield of the oil was 0.12%; n_D^{20} 1.4804; d_{20}^{20} 0.9038.

Acids, phenols, and a terpene fraction were isolated from the oil by the usual procedure [1]. The following were identified: butyric, caproic and enanthic acids and anethole. The terpene fraction was studied by the GLC method. The conditions for recording the chromatograms and the principle of the identification and determination of the individual components have been reported previously [2].

In the terpene fraction we detected 36 components, of which the following were identified: α-pinene (0.9%), β-pinene (0.9%), camphor (1.1%), borneol (0.6%), caryophyllene (10.0%), α-humulene (0.8%), germacrone (19.6%), and palustrol (41.3%). The main component of the terpene fraction was palustrol.

Earlier, in an investigation of the essential oils of the wormwoods of Siberia and the Far East we failed to detect ledol and palustrol [3], which are so characteristic for plants of the family Ericaceae [4].

Analysis of samples of the essential oils of arctic species of wormwood growing in the north-eastern part of the CIS enabled us to establish the presence of these compounds. Thus, in the essential oil of Artemisia arctica Less., palustrol amounted to 5.2% [5], while in the essential oil of Artemisia lagocephala (Bess.) DC the amounts of palustrol and ledol ranged from 15.3 to 64.0% and from 0.0 to 2.1%, respectively, depending on the growth site [6]. Under severe arctic conditions these components accumulate in considerable amount, which agrees with information on their amount in the essential oil of the genus Ledum L. [7].

LITERATURE CITED

1. M. I. Goryaev and I. Pliva, Methods of Investigating Essential Oils [in Russian], Alma-Ata (1962), p. 750.
2. M. A. Khanina, E. A. Serykh, T. P. Berezovskaya, and V. A. Khan, Khim. Prir. Soedin., No. 6, 859 (1991).
3. T. P. Berezovskaya, V. P. Amel'chenko, I. M. Krasnoborov, and E. A. Serykh, Wormwoods of Siberia [in Russian], Nauka, Novosibirsk (1991), p. 123.

Siberian State Medical Institute. Novosibirsk Institute of Organic Chemistry, Siberian Branch, Russian Academy of Sciences. Translated from Khimiya Prirodnykh Soedinenii, No. 2, pp. 303-304, March-April, 1993. Original article submitted August 3, 1992.

 0009-3130/93/2902-0254$12.50