3. C. Giovannozzi-Sermanni, Ric. Sci., 28, 1871 (1958).
4. C. C. Schmidt, C. Fischer, and I. Moowen, J. Pharm. Sci., 52, 468 (1963).
5. H. Fischer and G. Dangschat, Chem. Chem., 65B, 1009 (1932).
6. H. Fischer and G. Dangschat, Chem. Ber., 55B, 1037 (1932).
7. R. Davoli and M. Terni, Boll. Ist. Sieroter., Milano, 27, 142 (1948).
8. S. I. Zelepukha, Antimicrobial Properties of Plants Used in Food [in Russian], Kiev (1973).

ESSENTIAL OIL OF THE LEAVES OF *Citrus wilsonii*

N. A. Kekelidze and M. I. Dzhanikashvili

UDC 547.913

Citrus wilsonii Tan. is a good frost-resistant stock for citrus plants [1, 2]. We have investigated the chemical composition of the essential oil of the leaves of Wilson's citrus from the Batumi Botanical Garden of the Academy of Sciences of the Georgian SSR collected at the end of April, 1981.

The essential oil was obtained by the steam-distillation method. The oil was isolated from the distillate by extraction with n-pentane, the yield of essential oil being 0.43% on the dry weight.

The composition of the essential oil was determined by gas–liquid chromatography on a Varian Aerograph 1860 chromatograph using a flame-ionization detector. The best separation of the essential oil was achieved on a 550 × 0.2 cm column containing 10% of the stationary phase FFAP on Chromosorb G AW-DMCS 80/100 mesh. The carrier gas was helium at the rate of flow of 40 ml/min. The temperature of the column thermostat was programmed from 100 to 230°C.

The main component was isolated by preparative GLC in an 800 × 0.9 cm column filled with Chromosorb W 60/80 mesh. The monoterpene hydrocarbons were isolated on a column containing 30% of FFAP at 120°C with a rate of flow of the carrier gas of 120 ml/min. The components of the high-boiling fraction were isolated on a column containing 30% of Carbowax 20M at 170°C and a rate of flow of helium of 150 ml/min.

The components isolated were identified by comparing their IR spectra with those given in the literature [3]. Minor components were identified by comparing their retention times with the retention times of known pure substances on columns with different polarities [4].

The components were determined quantitatively by the internal-standard and internal-normalization method [4].

The composition of the essential oil of the leaves of Wilson's citrus was as follows (% on the whole oil): α-pinene, 2.1; β-pinene, 5.2; myrcene, 1.2; limonene, 8.4; α-phellandrene, 0.2; ocimene, 4.4; γ-terpinene, 27.1; p-cymene, 10.3; terpinolene, 0.2; citronellal, 4.3; decanal, 0.4; linalool, 2.9; terpinene-4-ol, 0.6; nonanol, 0.4; α-terpineol, 2.3; neral, 7.5; geranial, 0.3; citronellol, 3.2; nerol, 4.8; geranyl acetate, 3.2; geraniol, 1.4; ylangene, 2.5; caryophyllene, 0.3. Camphene Δ^3-carene, sabinene, octanal, and heptanal were detected in the oil in trace amounts.

LITERATURE CITED

1. P. M. Zhukovskii, Crop Plants and Their Relatives [in Russian], Leningrad (1971).
2. A. N. Tatarashvili, The Mutual Influence of Stock and Graft in Citruses [in Russian], Tbilisi (1980).
3. M. I. Goryaev and I. Pliva, Methods of Investigating Essential Oils [in Russian], Alma-Ata (1962).

Institute of Plant Biochemistry, Academy of Sciences of the Georgian SSR, Tbilisi.
Translated from Khimiya Prirodnykh Soedinenii, No. 6, pp. 785-786, November-December, 1982. Original article submitted May 20, 1982.

0009-3130/82/1806-0753$07.50

4. H. P. Burchfield and E. E. Storrs, Biochemical Applications of Gas Chromatography, Academic Press, New York (1962).

ESSENTIAL OIL OF THE LEAVES OF *Citrus junos*

N. A. Kekelidze and M. I. Dzhanikashvili

UDC 547.913

We have investigated the chemical composition of the essential oils of the leaves of *Citrus junos* (Sieb.) Tan which is an outstanding frost-resistant stock for citrus plants [1].

The leaves were collected for analysis at the end of April, 1981, from fruit-bearing plants from a plot in the Batumi Botanical Garden of the Academy of Sciences of the Georgian SSR. The essential oil was obtained by the steam distillation method. The oil was isolated from the distillate by extraction with n-pentane, its yield being 0.19% on the dry weight.

The composition of the essential oil was determined by gas–liquid chromatography on a Varian Aerograph 1860 instrument with a flame-ionization detector. The best separation of the essential oil was achieved in a 550 × 0.2 cm column containing 10% of FFAP on Chromosorb G AW-DMCS 80/100 mesh. The carrier gas was helium at a rate of flow of 40 ml/min. The temperature was programmed from 100 to 230°C.

The preparative isolation of the main substances of the essential oil was carried out on 800 × 0.9 cm aluminum columns filled with Chromosorb W 60/80 mesh. The monoterpenes were isolated on a column containing 30% of FFAP at 120°C and a rate of flow of carrier gas of 120 ml/min. The components of the high-boiling column were separated on a column containing 20% of DEGS at 170°C and a rate of flow of helium of 150 ml/min.

The isolated components were identified by comparing their IR spectra with those given in the literature [2].

A series of compounds was identified by the addition of authentic substances to the sample under investigation and their chromatography on columns with different polarities [3].

The amounts of the components in the essential oil of the leaves of *Citrus junos* were as follows (% on the whole oil): α-pinene, 0.9; β-pinene, 1.3; sabinene, 0.2; myrcene, 1.9; α-phenallandrene, 0.9; α-terpinene, 0.8; limonene, 3.3; ocimene, 4.7; γ-terpinene, 7.8; p-cymene, 17.9; terpinolene, 1.9; citronellal, 2.1; decanal, 2.5; linalool, 17.1; linalyl acetate, 1.9; β-elemene, 2.5; terpinen-4-ol, 0.9; α-terpineol, 2.2; neral, 0.6; geranial, 0.6; nerol, 0.5; geraniol, 1.2; 1-ylangene, 13.4; caryophyllene, 7.5; cubabene, 2.1; myrcene, 1.9. Camphene, geranyl acetate, and terpinyl formate were detected in the essential oil in trace amounts.

LITERATURE CITED

1. P. M. Zhukovskii, Crop Plants and Their Relatives [in Russian], Leningrad (1971).
2. M. I. Goryaev and I. Pliva, Methods of Investigating Essential Oils [in Russian], Alma-Ata (1962).
3. H. P. Burchfield and E. E. Storrs, Biochemical Applications of Gas Chromatography, Academic Press, New York (1964).

Institute of Plant Biochemistry, Academy of Sciences of the Georgian SSR, Tbilisi.
Translated from Khimiya Prirodnykh Soedinenii, No. 6, p. 786, November-December, 1982. Original article submitted May 25, 1982.

 0009-3130/82/1806-0754$07.50