



NOTE

Essential Oil Composition of *Biebersteinia orphanidis* Boiss. Growing in Mediterranean Region of Turkey

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The essential oil of *Biebersteinia orphanidis* Boiss. (Geraniaceae) growing wild in Mediterranean region of Turkey were obtained by hydrodistillation of the aerial parts (calyx), with a yield of 0.2 % and analyzed by GC and GC-MS. Thirteen components, representing 98.12 % of the oil, were identified. The main constituents of the oil were *cis*-limonene oxide (47.90 %), β -caryophyllene (9.70 %) and α -bisabolol (8.23 %). Oxygenated monoterpenes (51.25 %) were the main group of constituents of *B. orphanidis* essential oil.

Key Words: *Biebersteinia orphanidis*, Geraniaceae, Essential oil composition, Turkey, *cis*-Limonene oxide, β -Caryophyllene, α -Bisabolol.

The genus *Biebersteinia* (Geraniaceae) is represented by 2 species in Turkey¹. *Biebersteinia orphanidis* is used as medicinal, aromatic and coffee plant and known as "Coban Kahvesi and Kahvecik" in different regions of Turkey. In the folk medicine, it is used as herbal tea and coffee against jaundice, liver and kidney diseases and especially children stomach pain².

Biebersteinia orphanidis is a perennial plant has 20-70 cm height. Leaves are laciniae shortly oblong-lanceolate. It flowers from April to May. Flowers condense into a spike-like panicle. Calyx inflate in fruit is not hardened. Petals are pink and much shorter than the calyx. This plant prefers growing place in openings of *Cedrus libani* and *Abies cilicica* forest at 1700-1900 m and deep sandy-clayey soil in dolines over limestone¹. The dolines are partly covered by stands of *Berberis cretaegina* DC.

The purpose of this study is to investigate the chemical profile of calyxes that were obtained from *B. orphanidis* growing wild in Mediterranean region of Turkey.

The aerial parts (calyx) of *B. orphanidis* were collected from C3 Gazipasa Maha Yaylasi Antalya district in Mediterranean region of Turkey, on *Cedrus libani* and *Abies cilicica* forest, about 1850 m above the sea level at the end of June 2010 (Fig. 1). A voucher specimen is deposited at Herbarium of the Forest Botany Department of Suleyman Demirel University (ISPO) as Fakir 4857. The calyxes were dried in the shade at room temperature.

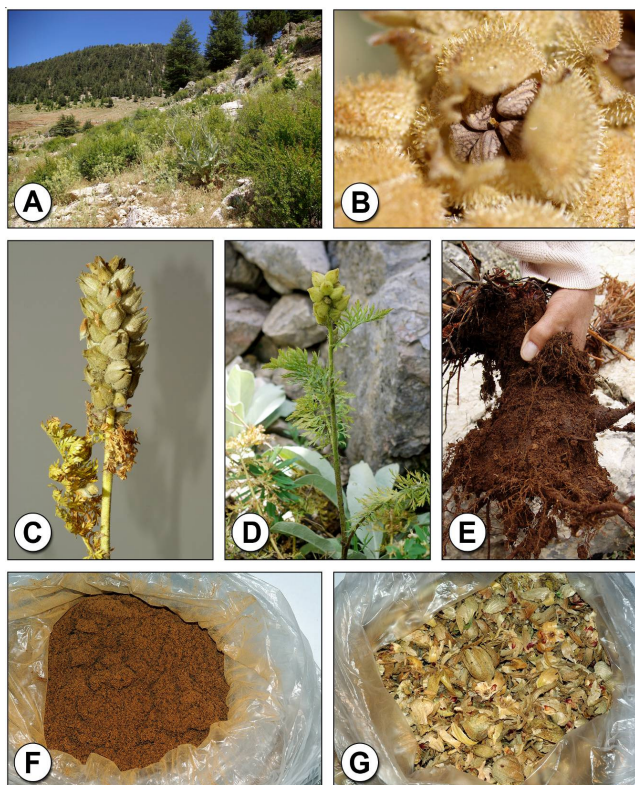


Fig. 1. (A) Habitat, (B) Ripe fruits, (C) Infructescence, (D) Habitus and inflorescence, (E) Root, (F) Coffee of fruit, (G) Calyxes used as herbal tea (Photographs by H. FAKIR)

Isolation of the essential oil: 200 g dried calyx of the plants were ground and submitted to hydrodistillation using a Clevenger-type apparatus for 3 h.

GC and GC-MS analysis: The GC-MS analysis of the oil was performed using a Hewlett Packard 6890-5973 GC-MSD system equipped with a HP-5MS column (30 m × 0.25 mm i.d., film thickness 0.25 μm). Helium (2 mL/min) was used as carrier gas. The initial temperature of the column was 60 °C for 5 min and then heated to 280 °C with a 4 °C/min rate. The conditions for flame ionization detector (FID) connected GC were the same as for GC-MS.

Identification of components: The components of the essential oil were identified by their retention times, retention indices relative to *n*-alkanes and by comparison of their mass spectra with the Wiley library or with published data³⁻⁵. Relative percentage amounts were calculated from the total chromatogram.

The hydrodistillation of the dried parts (calyx) of *B. orphanidis* growing wild in Mediterranean region of Turkey gave an essential oil with a yield of 0.2 %. As shown in Table-1, 13 components were identified in this oil, which represented

about 98.12 % of the total composition of the oil. The major constituents of the essential oil were *cis*-limonene oxide (47.90 %), β-caryophyllene (9.70 %) and α-bisabolol (8.23 %). The oil of *B. orphanidis* comprised 3 oxygenated monoterpenes (*cis*-limonene oxide, α-terpineol and linalyl acetate; representing 51.25 % of the oil), 4 sesquiterpene hydrocarbons (β-elemene, α-gurjunene, β-caryophyllene and germacrane-B; representing 19.97 % of the oil) and 6 oxygenated sesquiterpenes (spathulenol, caryophyllene oxide, α-cadinol, α-bisabolol oxide-B, (Z)-α-santalol and α-bisabolol; representing 26.90 % of the oil). The essential oil of the calyx parts of *B. orphanidis* is rich in oxygenated monoterpenes.

Tan *et al.*⁶ studied the essential oil obtained from the vegetative parts and fruiting stems of *Biebersteinia orphanidis* growing in southern Greece and found aliphatic hydrocarbons (25.74 %), benzene, 1-(1,5-dimethyl-4-hexenyl)-4-methyl (13.41 %) and juniper camphor (14.09 %) as the major constituents. There is no report on the volatile constituents obtained from calyx of *B. orphanidis*; therefore, we were unable to investigate variations of oil components due to differences in climatic conditions, geographic areas and kind of soils.

TABLE-1
COMPOSITION OF THE ESSENTIAL
OIL OF *Biebersteinia orphanidis*

Components	RI	%
<i>cis</i> -Limonene oxide	1131	47.90
α-Terpineol	1189	1.05
Linalyl acetate	1257	2.30
β-Elemene	1391	3.78
α-Gurjunene	1412	2.10
β-Caryophyllene	1418	9.70
Germacrane-B	1563	4.39
Spathulenol	1578	5.15
Caryophyllene oxide	1583	4.09
α-Cadinol	1654	2.24
α-Bisabolol oxide-B	1658	3.56
(Z)-α-Santalol	1674	3.63
α-Bisabolol	1686	8.23
Oxygenated monoterpene	–	51.25
Sesquiterpene hydrocarbon	–	19.97
Oxygenated sesquiterpene	–	26.90

RI: Retention indices on HP-5MS capillary column, %: Percentages calculated from FID data.

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