

## CHEMICAL INVESTIGATION OF THE HERBAGE OF

### *Melissa officinalis*

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Common balm, *Melissa officinalis* L., fam. Lamiaceae, is widely used in folk medicine and is an officinal plant in many countries of the world [1-4]. In the countries of Europe the number of preparations containing various substances from the leaves and herbage of this plant and used as sedative, spasmolytic, analgesic, hypotensive, and digestion-improving agents is about 300 [2-4].

Investigations of our own scientists has shown that common balm grown on the territory of the former Union also possesses sedative, cholagogic, diuretic, antiinflammatory, and wound-healing properties [5].

In the present paper we give the results of a chemical study of the herbage of common balm grown in Moscow province, Krasnodar Krai, and the Crimea.

An evaluation by the TLC method of the chemical composition of the phenolic substances of common balm showed that in all the samples of raw material of this plant investigated the dominating component was rosmarinic acid. With the aid of the successive chromatography on polyamide and silica gel of evaporated aqueous alcoholic extracts of common balm, we have isolated and identified seven individual substances belonging to the phenylpropanoid (1-3), flavonoid (4-6), and sterol (7) groups.

The substances isolated were identified on the basis of their UV, <sup>1</sup>H NMR, and mass spectra and also the results of chemical transformations.

**Rosmarinic Acid (1).** Light yellow substance with the composition C<sub>18</sub>H<sub>16</sub>O<sub>8</sub>. λ<sub>max</sub> (MeOH): 235, 242, 299 sh, 327 nm.

**Ethyl Rosmarinate (2).** Light yellow syrupy substance with the composition C<sub>20</sub>H<sub>20</sub>O<sub>8</sub>, λ<sub>max</sub> (MeOH): 235, 242, 299 sh., 328 nm.

**Caffeic Acid (3).** Light yellow crystals with the composition C<sub>9</sub>H<sub>8</sub>O<sub>4</sub>, mp 218-222°C, (aqueous acetone), λ<sub>max</sub> (MeOH): 235, 242, 299 sh., 326 nm.

**Cosmosiin (apigenin 7-O-3β-D-glucopyranoside) (4).** Light yellow crystals with the composition C<sub>21</sub>H<sub>20</sub>O<sub>10</sub>, mp 231-233°C (aqueous alcohol), λ<sub>max</sub> (MeOH): 269, 341, nm.

**Cynaroside (luteolin 7-O-β-glucopyranoside) (5).** Light yellow crystals with the composition C<sub>21</sub>H<sub>20</sub>O<sub>11</sub>, mp 232-234°C (aqueous alcohol), λ<sub>max</sub> (MeOH): 257, 266 sh, 352 nm.

**Luteolin (6).** Yellow acicular crystals with the composition C<sub>15</sub>H<sub>10</sub>O<sub>6</sub> (M<sup>+</sup> 286), mp 329-321°C, chloroform-ethanol, λ<sub>max</sub> (MeOH): 255, 267 sh., 352 nm.

**Daucosterol (β-sitosterol β-D-galactopyranoside) (7).** White crystals with the composition C<sub>35</sub>H<sub>60</sub>O<sub>6</sub>, mp 316-318°C (chl-MeOH).

It is interesting that compounds (1) and (3-5) have been described previously for common balm [4] while this is the first time that the rosmarinic acid ester (2), luteolin (6), and daucosterol (7) have been isolated from this plant.

The results of a study of the essential oil of common balm with the aid of the steam-distillation method showed that the amount of essential oil in the air-dry herbage of the plant grown in Moscow province ranged from 0.013 to 0.31%. According to GLC, the main components of the essential oil obtained were citronellal, geranial (citrinal), neryl acetate, cis-β-caryophyllene, trans-β-caryophyllene, and epoxycaryophyllene, which agrees with information in the literature [4].

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It must be mentioned that the quality of the leaves of the common balm is most frequently evaluated from its essential oil content [3, 4]. Thus, detection by the TLC method of the components in the essential oil, especially citral, is used to determine the authenticity of the raw material of this plant [4].

The wide distribution of citral in other essential oil plants of the Lamiaceae family has induced us to develop a TLC method of identifying the raw material of common balm from the presence of rosmarinic acid as the dominating phenylpropanoid possessing antiviral properties [4].

The deposition on a Silufol UV 254 plate of a sample of an aqueous alcohol extract of balm in a definite concentration enables rosmarinic acid to be detected on the chromatogram in UV light at a wavelength of 360 nm in the form of a single dominating bright blue spot with  $R_f$  0.5-0.6 (solvent system chloroform – MeOH – water, 26:14:3). On the investigation of other plants of the Lamiaceae family close to balm in morphological characteristics or having similar odors, rosmarinic acid was detected, only in small amounts, in the raw material of Moldavian dragon's-head, peppermint, and Java pea, while this component was not detected in the raw material of catmint and dead nettle.

In our view, the presence of rosmarinic acid can also be used to determine the authenticity of preparations based on aqueous or aqueous alcoholic extracts of common balm.

## REFERENCES

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