

CARBOXYLIC ACIDS OF *Galium boreale* HERB**T. V. Ilina, O. V. Goryacha, A. M. Kovalyova, O. M. Koshovyi, N. V. Borodina**

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Galium boreale L. or northern bedstraw is widespread over the temperate and subarctic regions of Europe, Asia and North America, including most of Canada and the northern United States. It is found all over the territory, except the arid southern areas in Ukraine. Currently, *Galium boreale* is used in folk medicine for treatment of cardiac conditions, liver and kidney problems, and externally as a healing remedy.

The aim of the present research was to study the composition of the carboxylic acids of *Galium boreale* herb. The plant material was harvested in the Botanical gardens of V. N. Karazin Kharkiv National University in June 2017, with the herbarium voucher stored at the Herbarium of Pharmacognosy Department of the National University of Pharmacy. In *Galium boreale* herb, 21 carboxylic acids were identified, including 13 monobasic acids, 7 dibasic acids (oxalic, succinic, malonic, 2-hydroxy-3-methylglutaric, fumaric and aselainic) and 1 tribasic (citric) acid. By the radical linked to the carboxyl group the acids were classified as 3 aromatic acids (benzoic, salicylic and vanillic) and 18 aliphatic acids, including 10 fatty acids (6 saturated and 4 unsaturated fatty acids).

For the analysis of the content of carboxylic acids in the air-dried plant material (50 mg) in a 2 mL vial, an internal standard (50 mg of tridecane in hexane) was added as well as 1.0 ml of a methylating agent (BCl_3 in methanol, 14% solution, Supelco 3-3033). For the extraction and hydrolysis of fats and other esters as well as for a simultaneous methylation of fatty acids and other organic acids, the mixture was heated in a sealed vial for 8 hours at 65 °C. Then, the reaction mixture was decanted from the plant material and the precipitate was diluted in 1 mL distilled water, from which methyl esters of the carboxylic acids were extracted with 0.2 mL methylene chloride. The mixture was gently shaken several times within an hour and then the obtained extract of the methyl esters was chromatographed. The sample injection (2 μL) was performed in a splitless mode at an injection rate of 1.2 mL/min per 0.2 min.

The content of hydroxyl acids totaled 11311.2 mg/kg, which comprised 42.69 % of the total fatty acid content; the dibasic acids content totaled 3411.4 mg/kg, which comprised 12.88 % of the total fatty acid content; the aromatic acids content totaled 283.4 mg/kg which comprised 1.07 % of the total fatty acid content; whereas the content of fatty acids was 11485.9 mg/kg, which comprised 43.36 % of the total fatty acid content. The content of the saturated fatty acids equaled 55.29 % of the total fatty acid content, and the unsaturated fatty acid content was 44.71 %. The dominating acids (mg/kg) among the hydroxyl acids was tribasic citric acid (7427.0), among the dicarboxylic acids dominating was oxalic acid (2387.4). Among aromatic acids, prevailing was vanillic acid (157.7), and among fatty acids, palmitic acid (5052.3) and linolenic acid (2571.6) dominated. The total carboxylic acid content in *Galium boreale* herb was 2.65 %. The presence of benzoic, salicylic, fumaric and succinic acids may account for antimicrobial and fungicidal effect in the substances of *Galium boreale* herb.