THE CHROMATOGRAPHY – MASS SPECTROMRTY STUDY OF SALIX ROSMARINIFOLIA L.

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Abstract. Introduction. Plants of the *Salix* genus (*Salicaceae* family) are the promising objects for study. They are the sources of highly active natural compounds used in folk medicine for a long time for the treatment of many diseases. The aim is to determine the component composition of volatile compounds and organic acids of the raw material of *Salix rosmarinifolia L*.

Introduction. One of the priorities of pharmacy is to expand the range of medicines due to introduction of new medicinal plants into medical practice. As it is known, herbal medicines are not inferior to synthetic analogs by their effectiveness; they have a favorable effect on the body with long-term application, and are used in the process of rehabilitation of all age groups. Plants of the *Salix* genus are the promising objects for study. They are the sources of highly active natural compounds used in folk medicine for a long time as anti-inflammatory, diuretic, antipyretic, disinfectant, haemostatic, astringent, sedative, wound healing, choleretic and antirheumatic drug for the treatment of many diseases. Some species of the genus are officinal in the European countries.

Materials and Methods. The objects of research were samples of *Salix rosmarinifolia L.* shoots collected in Kharkiv region of Ukraine in 2014–2015.

The chromatography - mass spectrometry study of the raw material was conducted on an Agilent Technologies 6890N chromatograph with a mass spectrometric detector 5973N at the National Institute of Grapes and Wine "Magarach" of the Ukrainian Academy of Agrarian Sciences by the method. To determine organic and phenolcarboxylic acids the internal standard (50 μg of tridecane dissolved in hexane) and 1.0 ml of the methylating agent (14% BCI3 in methanol Supelco 3-3033) were added to 0.05 g of the dried plant raw material in a 2 ml vial. The mixture was kept in a sealed vial for 8 h at the temperature of 65°C. During this period the exhaustive extraction of the plant material, hydrolysis and methylation of fatty acids took place. At the same time free organic and phenolcarboxylic acids were methylated. The reaction mixture was decanted from the precipitate of the plant material and diluted with 1 ml of distilled water. To extract methyl esters of organic acids 0.2 ml of methylene chloride was added, gently shaken for an hour, and the resulting extract of methyl esters of organic acids was chromatographed on an Agilent Technologies 6890N chromatograph with a mass spectrometric detector 5973N. The sample injection into the

chromatographic column was carried out in the splitless mode, and the rate of the sample injection was 1.2 ml/min for 0.2 min. The conditions of determination were as follows: the INNOWAX chromatographic capillary column with the length of 30 m and the internal diameter of 0.25 mm was used; the carrier gas was helium; the flow rate of the carrier gas was 1.2 ml/min; the temperature of the sample injection heater was 250°C; the thermostat temperature was programmed from 50°C to 250°C at the rate of 4°C/min; the detector temperature was 250 °C.

Discussion and conclusions. By the method of chromatography – mass spectrometry 30 volatile compounds have been identified in *Salix rosmarinifolia L.* shoots, among them eugenol, geraniol and squalene prevail. There are also 32 carboxylic acids, and among aromatic acids 2-methoxybenzoic and salicylic acids dominate by their content. The significant content of hydroxycinnamic acids derivatives is of considerable interest.

In *Salix rosmarinifolia L.* shoots 32 carboxylic acids have been identified by the method of chromatography - mass spectrometry, among them there are 11 fatty acids – 7 saturated and 4 unsaturated ones (oleic, linoleic, linolenoic, arachic acids). Among unsaturated acids essential polyunsaturated acids – linoleic (omega 3) and linolenoic (omega 6) acids significantly prevail by their content. These acids play an important role in the normal functioning of the human body. They are the main components of fatty oils of flax and soy, which are successfully used as antioxidant, hypolipidemic, membrane-stabilizing, antiaggregant drugs when treating atherosclerosis and various dermatological diseases. Among the saturated acids identified palmitic acid greatly dominate by its content. It is part of natural waxes. In *Salix rosmarinifolia L.* shoots 13 aliphatic acids (azelaic, caproic, oxalic, malonic, fumaric, succinic, heptadecanoic, malic, citric) and 8 aromatic acids (benzoic, phenylacetic, salicylic, vanillic, 2-methoxybenzoic, 4-hydroxybenzoic, syringic, ferulic) have been also identified. Among aliphatic acids oxalic and citric acids are noticeably prevalent by their content compared to other aliphatic acids. The composition and the content of aromatic acids identified in shoots have attracted the most scientific interest. These acids are presented by salicylic acid, benzoic acid, its derivatives and hydroxycinnamic acids. Among aromatic acids 2-methoxybenzoic (6568.13 mg/kg) and salicylic (2585.49 mg/kg) acids prevail by the content. To some extent it allows explaining the high pharmacological activity of drugs from willow. Benzoic acid is an aglycone of phenolic glycoside – populin containing in plants of the *Salicaceae* family. Populin in the body is hydrolyzed to benzoic acid, which exhibits antiseptic properties. Benzoic acid is used in medicine in skin diseases, as an external antiseptic and fungicidal agent, in trichophytosis and mycosis, and its sodium salt – as an expectorant. Esters of benzoic acid (from methyl to amyl ester) have a strong odor and are used in the perfume industry.