DETERMINATION OF THE MONOSACCHARIDE COMPOSITION BY PAPER CHROMATOGRAPHY METHOD FROM ACORUS CALAMUS L., HELICHRYSI MARACANDICUM POP EX KIRP. AND AERVA LANATA L.

Mahmudova.L.A.
Khusainova.R.A.
Tashkent Pharmaceutical Institute, Tashkent city, Republic of Uzbekistan
e-mail: makhmudova.l.a.1610@gmail.com
https://doi.org/10.5281/zenodo.17333711

Relevance: Plant polysaccharides are multifunctional biopolymers with a wide range of pharmacological activities. Water-soluble polysaccharides (WSP), pectin substances (PS), and hemicelluloses (HC) deserve special attention because of their antioxidant, immunomodulatory, anti-inflammatory, and wound-healing properties. The plants Acorus calamus L., Helichrysi maracandicum Pop ex Kirp. and Aerva lanata L. are widely used in folk and traditional medicine, but their combined composition has not been studied for the first time.

The aim of this study was to determine the monosaccharide composition of the extracts obtained from the following plants: Acorus calamus L., Helichrysi maracandicum Pop ex Kirp., and Aerva lanata L. using paper chromatography.

Materials and methods: Different polysaccharide groups were separated using the above-described method. Chromatographic analysis revealed that the alcohol-soluble sugars consisted of fructose, glucose, and sucrose. Water-soluble polysaccharides were extracted using water extraction. First, water-soluble polysaccharides (WSP) were isolated, followed by the sequential isolation of pectin substances (PS) and hemicelluloses (HMC). Before analysis, the raw materials were cleaned of foreign substances. One hundred grams of crushed raw materials (Acorus calamus L. (root), Helichrysi maracandicum Pop ex Kirp. A. lanata L.(flowers) and Aerva lanata L. (above-ground parts), and three test mixtures were treated twice with a hot mixture of methanol and chloroform (1:1) to remove dyes and non-carbohydrate components. The raw materials were then separated by filtration and dried afterward. The isolated substances were analyzed using paper chromatography (PC) Filtrac-FN 13, 18 (Germany). The following solvents were used in the following ratio: n-butanol-pyridine-water (6:4:3). The following reagents were used for opening: 1) acid phthalate aniline (5 min, at 100°C), and 2) 5% urea solution.

Results: The dried raw material was extracted twice with hot ethyl alcohol (1:6) at 82 °C for 1 h. The alcohol extracts were combined, evaporated, and analyzed chromatographically in system 1, resulting in the detection of traces of glucose, sucrose, and fructose. After complete acid hydrolysis of WSP, PS, and HMC, 100 mg of the isolated polysaccharides were hydrolyzed with 3 ml of 1n H_2SO_4 solution at 100°C: WSP for 8 h and PS and HMC for 24 h. After the specified time, the hydrolysate was placed in a beaker and neutralized with barium carbonate. The resulting precipitate was filtered, and the filtrate was deionized with KU-2 cationite, evaporated to a small volume (0.5 ml), and chromatographed on FN-18 paper in an n-butanol-pyridine-water (6:4:3) system with specific monosaccharides (control samples). After drying, the chromatograms were treated with acid aniline phthalate and heated in an oven at 110°C for 1-2 minutes. Galactose, arabinose, and glucose were found in the monosaccharide composition of the polysaccharides.

Conclusion: The monosaccharide composition of polysaccharides in the extracts obtained from the collection of plants Acorus calamus L., Helichrysi maracandicum Pop ex Kirp., and Aerva lanata L. was studied using paper chromatography. Given that their composition is very similar to that of

the plants studied separately, as well as the preservation of high quantitative productivity, these plant collections can be used as effective biological products in the future.