

The study of polysaccharides of the herb *Chondrilla sitterniform*
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Study of polysaccharide complex in herb *Chondrilla juncea*
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SUMMARY

The water-soluble polysaccharide complex, pectin substances, hemicellulose A and hemicellulose B. The analysis of the polysaccharide complex was carried out by paper chromatography after acid hydrolysis. It was found that the predominant monosaccharides of the polysaccharide complex are galactose and arabinose. The basis of pectin substances is galacturonic acid, and the basis of hemicelluloses A and B is galactose and glucose.

Keywords: chondrilla sitnikovaya, water soluble polysaccharides, pectin substances, hemicellulose, chromatography method.

RESUME

Water-soluble polysaccharide complex, pectins, hemicelluloses A and B at first were isolated and studied from herba of *Chondrilla juncea*. The qualitative monosaccharide composition of polysaccharide complex, pectins and hemicelluloses was estimated by the method of paper chromatography after sulfuric acid hydrolysis. It has been found out that monosaccharide composition of water-soluble polysaccharide complex consists of 7 substances: glucose, galactose, arabinose, rhamnose, xylose, galacturonic acid and glucuronic acid, with galactose, arabinose and glucuronic acid prevailing. The base of pectins was composed of galacturonic acid. The base of hemicelluloses was composed of xylose and galactose.

Keywords: *Chondrilla juncea*, water-soluble polysaccharide complex, pectins, hemicelluloses, method of paper chromatography.

Currently, more and more attention is paid to polysaccharides. Polysaccharides have anti-inflammatory, antiulcer, anti-tumor, expectorant and other types of activity [3, 5].

All this indicates the relevance of studying plant materials containing this group of compounds.

The aim of the study is to study the polysaccharides of the herb *chondrilla sitnikovidny*.

Materials and research methods

The object of the study was dry air-crushed grass of *chondrilla sitnikovidny*, harvested in 2013–2014. in the Kursk region in

the period of mass flowering of the plant.

To isolate polysaccharides, air-dry crushed raw materials were pretreated with ethyl alcohol 70% to remove polyphenolic compounds, then the water-soluble polysaccharide complex was extracted with purified water.

Air-dry meal was extracted with purified water in a ratio of 1:20 to the mass of raw materials when heated to 95 °C for 1 hour with constant stirring. Re-extraction of polysaccharides was carried out twice with purified water in a ratio of 1:10. The meal of the raw material was separated by centrifugation, and the combined aqueous extracts were evaporated to 1/5 of the original volume. Polysaccharides were precipitated with a triple volume of ethyl alcohol 96% at room temperature. The formed dense precipitate of polysaccharides was separated, washed with ethyl alcohol 70%, acetone. The resulting water-soluble polysaccharide complex was lyophilized [1].

To establish monosaccharide composition, included in water-soluble polysaccharide complex, hydrolysis was carried out with 2N sulfuric acid at 100°C for within 6 hours. The hydrolyzate was neutralized with barium carbonate using a universal indicator until neutral, filtered and precipitated with 96% ethyl alcohol. The formed precipitate was treated with KU-2 cation exchanger to acidic reaction. Separation and identification of neutral monosaccharides was carried out by paper chromatography in a descending manner in the solvent system n-butanol - pyridine - water (6: 4: 3) in parallel with standard sugar samples. Acid monosugars were separated in the system ethyl acetate - formic acid - water - acetic acid (18: 1: 4: 3). Developer - aniline phthalate, development temperature 100°C, the duration of manifestation is 10-15 minutes [2].

Pectin substances were isolated from the meal remaining after obtaining the water-soluble polysaccharide complex. The meal was extracted with a mixture of 0.5% solutions of oxalic acid and ammonium oxalate (1: 1) in a ratio of 1:20 at 80-85 °C for within 2 hours. Re-extraction was carried out twice at a ratio of 1:10. The combined acidic extracts were concentrated and precipitated with a fivefold volume of ethyl alcohol 96%. The resulting precipitate was filtered off, washed with ethyl alcohol 96%, dried and weighed [1].

The meal remaining after the isolation of pectin substances was poured with a five-fold volume of a 10% aqueous solution of sodium hydroxide and left at room temperature for 12 hours. Then it was filtered through four layers of cheesecloth. To the resulting filtrate was added two volumes of acetic acid. The formed precipitate was filtered off through a filter. A precipitate of hemicellulose A formed on the filter in the form of a brownish mass. A two-fold volume of ethyl alcohol 96% was added to the filtrate to precipitate hemicellulose B. The resulting precipitate was filtered through a filter, washed with alcohol, and dried [2, 4].

To establish the monosaccharide composition of pectin substances and hemicellulose A and B, they were hydrolyzed with 2N sulfuric acid. Weighed portions of pectin substances and hemicelluloses A and B (0.05) were placed in ampoules with a capacity of 5

10 ml, 2.5 ml of sulfuric acid solution (1 mol / L) was added, ampoules were sealed and hydrolyzed at a temperature of 100-105°C for 24 hours for pectin substances and 48 for hemicellulose A and hemicellulose B. Further, acidic and neutral monosaccharides were determined in hydrolysates in the same way as their determination in a water-soluble polysaccharide complex [1, 2].

Results and its discussion

As a result of the studies carried out, a water-soluble polysaccharide complex, pectin substances, hemicellulose A and hemicellulose B.

The output of the water-soluble polysaccharide complex was 3.45% of the weight of the air-dry raw material (Table 1). The water-soluble polysaccharide complex of the herb chondrilla sitnikovidny is an amorphous powder of light brown color, odorless, readily soluble in water, practically insoluble in organic solvents, gives positive precipitation reactions with alcohol, acetone, Felling's reaction after acid hydrolysis, and also forms an orange color with a solution of lead acetate and a greenish precipitate with copper sulfate.

In the study of monosaccharide composition water-soluble of the polysaccharide complex in the hydrolyzate, the presence of 7 substances of a monosaccharide nature was established by chromatography on paper; with reliable samples identified glucose, arabinose, galactose, xylose, rhamnose, glucuronic and galacturonic acid, the predominant of which are galactose, arabinose.

The output of pectin substances was 10.59% of the mass of air dry raw materials (Table 1). Pectin substances from the herb chondrilla sitnikovidny are a light cream powder, well soluble in water to form a viscous solution (pH 1% aqueous solution 3-4). Aqueous solutions of pectin substances are precipitated with a 1% solution of aluminum sulfate with the formation of pectates [2].

In the study of the monosaccharide composition of pectin substances by paper chromatography, 5 substances of a monosaccharide nature were identified; with reliable samples identified arabinose, galactose, glucose, xylose and galacturonic acid, the predominant of which is galacturonic acid.

The output of hemicellulose A was 14.54%, and hemicellulose B was 5.57% of the mass of air dry raw materials (Table 1). Hemicellulose A and hemicellulose B are represented by 4 substances of a monosaccharide nature: galactose, xylose, arabinose, glucose, the predominant of which are galactose and glucose.

conclusions

For the first time, a water-soluble polysaccharide complex, pectin substances, hemicellulose A and hemicellulose B were isolated and studied from the herb of chondrilla sitnikovidi. It was established that the predominant monosaccharides of the polysaccharide complex are galactose and arabinose. The basis of pectin substances is galacturonic acid, and the basis of hemicelluloses A and B is galactose and glucose.

Table 1

The output of polysaccharide fractions from the herb chondrilla sitnikovidny

Название сырья	Фракции полисахаридов, %			
	водорастворимые полисахариды	пектиновый комплекс	гемицеллюлоза А	гемицеллюлоза Б
Трава кульбабы	3,45	10,52	14,54	5,57

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Bubenchikova, V.N. Study of polysaccharides of the herb Chondrilla sitnikovidny / V.N. Bubenchikova, V.N. Levchenko, D.S. Nasedkin // Traditional medicine. - 2015. - No. 2 (41). - P.34-36.

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