CARBOHYDRATES OF Sorbus aucuparia

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The fruit of the European mountain ash contains a series of pharmacologically active substances belonging to various classes of natural compounds [1-3]. However, insufficient attention has hitherto been devoted to the polysaccharides in the fruit of this species.

In the present communication we give the results of a study of the polysaccharides isolated from the fruit of the European mountain ash gathered in 1987 in Khar'kov province.

The carbohydrates were extracted from the raw material successively with 82% ethanol (alcohol-soluble substances, ASSs), water (water-soluble polysaccharides, WSPSs), and a mixture of solutions of oxalic acid and of ammonium oxalate (pectin substances, PcSs), followed by precipitation with ethanol.

To determine their monosaccharide compositions, the polysaccharides were subjected to acid hydrolysis (2 N H_2SO_4, 100°C, 1-6 h), with the subsequent identification of the monosaccharides by paper chromatography in the butanol–pyridine–water (6:4:3) and ethyl acetate–acetic acid–formic acid–water (18:3:1:4) systems and by thin-layer chromatography on Silufol plates in the butanol–acetone–water (4:5:1) and ethyl acetate–pyridine–water (2:1:2) systems.

Reducing sugars were revealed with aniline phthalate, and nonreducing sugars with the Bonner reagent [5].

The amounts of polysaccharides were determined by a gravimetric method [6]. Reducing and acid sugars were determined, respectively, by the picrate [7] and carbazole [8] methods. Amounts in the fruit: WSPSs – 6.5%; PcSs – 8.5%.

The hydrolysate consisted of galacturonic acid and neutral sugars, as was confirmed by the amount of acid sugars. The amount of reducing sugars in the WSPSs was 5.3% and in the PcSs 5.0%.

The PcSs were studied in more detail. The PcS fraction contained 64.46% of polysaccharides, 23.89% of acid sugars, and 54.44% of reducing sugars, together with 12.54% of protein and 10.16% of ash. According to titrimetric results, in the PcS fraction the total amount of carboxy groups was 4.25%, including 2.79% of free carboxy groups and 1.46% of methoxylated carboxy groups, and the amount of methoxy groups 1.10%, the degree of esterification being 34. The pectin had a high positive specific rotation $[\alpha]_D^{22}$ +[illegible]° (c 0.25; H_2O) and a molecular mass of 4000, its monosaccharide composition being represented by galactose, arabinose, glucose, and galacturonic acid in a ratio, without taking the galacturonic acid into account, of 43:41:15, respectively (by paper chromatography).

Thus, fractionation showed that the carbohydrate complex of European mountain ash fruit includes water-soluble polysaccharides, pectin substances, and free monosaccharides. The fractions isolated were characterized by their monosaccharide compositions and their content of polysaccharides and of reducing and acid sugars.

The study of the carbohydrates of European mountain ash fruit permits the PcS fraction to be regarded as the most promising for pharmacological investigations.

LITERATURE CITED

1. S. A. Deren'ko, N. I. Suprunov, and N. A. Kurmenchik, Rast. Res., 15, No. 3, 451 (1979).
2. M. I. Borisov. The Medicinal Properties of Agricultural Plants [in Russian], Urozhai, Minsk (1974), p. 336.
3. R. I. Skvortsova and N. L. Vorontsova, in: Questions of Increasing the Effective and Rational Use of the Component Parts of Food Raw Material in the Preparation of Nutritional Products [in Russian], Moscow (1982), pp. 98-102.

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0009-3130/92/2805-0501$12.50

4. V. N. Chushenko, N. P. Dzyuba, and O. E. Karamova, in: Abstracts of Lectures at the 1st All-Union Conference on the Use of Chromatography in Biology and Medicine [in Russian], Moscow (1983), p. 271.
5. T. Q. Bonner, Chem. Ind. (London), 345 (1960).
6. VFS [All-Union Pharmaceutical Standard] 42-1696-87. Marshmallow Herbage [in Russian].
7. N. P. Dzyuba, G. Ya. Khait, and V. N. Chushenko, Farm. Zh., No. 6, 54 (1975).
8. M. P. Filippov, V. T. Vlas'eva, B. I. Kuz'minov, V. N. Chushenko, and N. P. Dzyuba, Izv. Akad. Nauk MSSR, Ser. Biol. Chem., 75 (1976).

LIPIDS OF THE WOODY VERDURE OF THE SIBERIAN LARCH

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At the present time, great attention is being devoted to the problem of the complex utilization of wood biomass. Woody verdue (WV) is one of the main waste materials in the processing of conifer wood. The current technological schemes for the treatment of the WV of conifers is based on the use of spruce, pine, and fir as the raw material [1]. The Siberian larch has not been used for these purposes. This is connected, in the first place, with the seasonal nature of its needles and, in the second place, with the inadequate degree of study of the chemical composition of its WV, particularly in relation to the lipid metabolism. The first point is not a serious disadvantage. If exhaustive information on the chemical composition of the larch WV were available it could be used in complex processing in admixture with other species.

We have investigated the lipids of Siberian larch WV and the change in lipid composition in the course of vegetative growth. The WV consisted of needles and lignifying shoots. We determine the mechanical composition of the Siberian larch WV in the course of the vegetation period:

WV fraction, % on the total weight	Time of collecting the Specimens				
	May	June	July	August	September
Needles	74.70	71.58	69.43	68.31	68.85
Lignifying shoots up to 8 mm in diameter	25.30	28.42	30.57	31.69	33.15

As can be seen from the figures given above, in the period from May to September the amount of needles decreased, which is connected with an increase in the diameter of the lignifying shoots.

The lipids were extracted by the Bligh–Dyer method [2]. The total lipids (TLs) obtained were fractionated by column chromatography on silica gel [3]. As a result of which neutral lipids (NLs), glycolipids (GLs), and phospholipids (PLs) were obtained (% of the absolutely dry weight):

Time of collecting the specimens	Needles			Lignifying shoots		
	NLs	GLs	PLs	NLs	GLs	PLs
May	2,04	0,36	0,12	2,61	0,74	0,26
June	2,71	0,96	0,17	4,15	1,14	0,38
July	3,49	1,80	0,67	4,04	0,85	0,35
August	3,12	0,86	0,45	3,09	0,68	0,29
September	2,93	0,30	0,22	2,85	0,64	0,25

In the TLs of both the needles and the lignifying shoots the bulk consisted of NLs. Polar lipids (PoLs) were represented in considerably smaller amounts, and more than half of them consisted of GLs.

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