3. A. I. Yakovlev, S. I. Budantseva, G. I. Churilov, G. Yu. Lavrenova, P. A. Pychenkova, K. N. Sysoeva, and L. Yu. Zharikova, in: The Chemistry and Biochemistry of Carbohydrates: Abstracts of Lectures at the VIIth All-Union Conference on the Chemistry and Biochemistry of Carbohydrates [in Russian], Pushchino (1982).
4. V. V. Arasimovich, S. V. Baltaga, and N. P. Panomareva, Izv. Akad. Nauk MSSR, 83 (1970).
5. V. M. Easterwood and B. L. Huff, Svensk Pappeerstidn, 72, 768 (1969).

A GLUCOFRUCTAN OF *Polygonatum roseum*. X.

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UDC 547.917

We have continued an investigation of the polysaccharides of *Polygonatum roseum* (Ledeb.) [1]. After the precipitation with alcohol of the water-soluble polysaccharide from the aqueous alcoholic filtrate we obtained the combined glucofructans with a yield of 10.8% on the air-dry material. A homogeneous glucofructan (GF) was obtained by a known method [2]. The GF had $[a]_D^{22} - 24.2°$ (c 1.0; water) and a molecular weight of 2600. In the products of complete acid hydrolysis glucose and fructose were detected by PC (the butan-1-ol—phenol—acetic acid—water (5:5:2:10) system), and their amounts were determined by Kolthoff's method [3] as 7.4 and 92.6%, respectively.

In the products of Smith degradation glycerol was detected by PC (butan-1-ol—pyridine—water (6:4:3) system; spots revealed with KIO_4—$KMnO_4$—benzidine), which shows the presence of a 2 → 1 or 2 → 6 bonds between the hexose residues.

The glucofructan was methylated twice by Hakomori's method [4], the completeness of methylation being checked by IR spectroscopy. In a hydrolysate of the permethylate 2,3,4,6-tetra-O-Me-D-glucose, 1,3,4,6-tetra-O-Me-D-fructose, 1,3,4-tri-O-Me-D-fructose, and 3,4,6-tri-O-Me-D-fructose were detected by TLC (benzene—acetone (2:1) system).

Thus, it follows from the methylation results that the GF has a linear structure with 2 → 1 and 2 → 6 bonds.

Glucose, fructose, sucrose, and fructooligosaccharides with R_f 0.50, 0.27, 0.15, and 0.08, respectively, were detected in the products of partial acid hydrolysis (0.1% CH_3COOH, 100°C, 10 min) by PC (butan-1-ol—pyridine—water (6:4:3) and butan-1-ol—acetic acid—phenol—water (5:2:5:10) systems; revealing agent: urea).

The ^{13}C NMR spectrum of the GF had signals of carbon atoms at 75.99 and 104.8 ppm relating to the C-2 and C-4 atoms of a section-joining fructofuranose link, i.e., when 2 → 1 and 2 → 6-bound fructofuranose residues are adjacent to one another. This confirmed once again that the GF had inulin (2 → 1) and levan (2 → 6) types of bonds. The chemical shifts of the other carbon atoms are given below:

Residue	C-1	C-2	C-3	C-4	C-5	C-6
→2-β-Fruf 1	61.6	104.36	77.93	75.28	82.26	63.45
→2-β-Fruf 6	61.79	104.8	78.08	75.69 75.99*	81.33	63.71
→1-*α*-*D*-Glcp	93.28	72.75	73.56	70.47	72.22	61.4

*Section-joining links 104.8 and 75.99 ppm.

The chemical shift of 93.28 ppm for the α-glucopyranose signal indicated that a glucose residue was present at the "reducing" end of the polymeric chain and was attached to inulin units. The quantitative ratio of the 2 → 1 and 2 → 6 bonds calculated from the integral intensity of the chemical shifts was 4:1.

On the basis of the results obtained, the following structure may be suggested for the GF

$$\mathrm{Glcp}\,1 \rightarrow 2\,\mathrm{Fruf}\,1 - [\rightarrow 2\,\mathrm{Fruf}\,1 \equiv]_{\overline{n}} \rightarrow [2\,\mathrm{Fruf}\,6 \equiv]_{\overline{m}} \rightarrow 2\,\mathrm{Fruf}\,6 \quad n + m = 13.7$$

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0009-3130/87/2302-0247$12.50

The glucofructan obtained differs from known glucofructans of the *Allium* genus [5] and *Triticum vulgare* [6] by its molecular weight, the ratio of the types of bonds, and the absence of branching in the chain.

LITERATURE CITED

1. R. K. Rakhmanberdyeva, G. V. Nikonovich, D. A. Rakhimov, and Kh. T. Sharipov, Khim. Prir. Soedin. 15 (1986).
2. R. K. Rakhmanberdyeva and D. A. Rakhimov, Khim. Prir. Soedin., 105 (1986).
3. A. V. Peterburgskii, Practical Handbook on Agrochemistry [in Russian], Moscow (1954), p. 98.
4. S. Hakomori, J. Biochem., (Tokyo), 55, 2051 (1964).
5. M. Khodzhaeva, E. F. Ismailov, E. S. Kondratenko, and A. S. Shashkov, Khim. Prir. Soedin., 23 (1982).
6. R. Montgomery and F. Smith, J. Am. Chem. Soc., No. 2, 446 (1957).

WATER-SOLUBLE POLYSACCHARIDES OF THE LEAVES OF *Actinidia colomicta*

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UDC 547.917

We have studied the water-soluble polysaccharides (WSPSs) of the leaves of male and female plants of *Actinidia colomicta* M. [1] and their monosaccharide composition.

The WSPSs were extracted from the air-dry raw material (moisture content 10-11%, collected in 1984) with water and were demineralized, and their ash content was determined by methods described previously [1, 2] and the amount of uronic anhydride by complexonometric titration [3]. The ash content of the demineralized polysaccharides was 0.6-0.8%. The hydrolysis of the polysaccharides and the subsequent operations with them were carried out as described previously [2, 4]. The hydrolysates were investigated by PC in the butan-1-ol-pyridine-water (6:4:3) system. The neutral sugars were revealed with aniline phthalate.

It was established that the WSPSs of the leaves of male and female plants consisted of eight monosaccharide components: D-galacturonic acid, D-galactose, D-glucose, L-arabinose, D-xylose, L-rhamnose, and two unidentified monosaccharides present in trace amounts and chromatographically more mobile that D-xylose and L-rhamnose. The quantitative amounts of the neutral monosaccharides were determined as described in [4]:

Phase of development	Yield of WSPSs, %	Ash content, %	Amount of the monosaccharides on the total taxes as 100%					GalUA, %
			Gal	*Glc*	*Ara*	*Xyl*	*Rha*	
		Male plant						
Green fruit	2,9	18,9	50,4	6,1	31,3	7,8	4,4	54,9
Ripening fruit	3,1	18,8	45.5	12,1	33,3	5,1	4,0	50,8
Ripe fruit	3,3	19,1	50,0	6,9	29,2	8,3	5,6	51,2
Mass leaf-fall	4,1	20,3	45.7	4,9	33,4	11,1	4,9	51,1
		Female plant						
Green fruit	3,3	19,8	44,0	12,1	34,9	4,5	4,5	54,6
Ripening fruit	3,8	18,7	50,0	8,9	32,1	5,4	3,6	54,6
Ripe fruit	4,1	18,9	33,8	8,5	49,3	4,2	4,2	52,8
Mass leaf-fall	4,6	20,1	35,8	5,6	47,2	5,7	5,7	51,6

As we see, in ontogenesis, the accumulation of PSs in the leaves rises: their greatest amount accumulates in the male and female plants in the period of mass leaf-fall, and the smallest amount in the green-fruit phase. No substantial differences were detected in the amounts of ash and galacturonic acid residues in the WSPSs. The predominating components of the polysaccharides of the leaves in all stages of ontogenesis were galactose and arabinose, the amount of the former in the period of mass leaf-fall decreasing in the male plants by a factor of 1.1 and in the female plants by a factor of 1.2, while the amount of the latter rose (by factors of 1.1 and 1.3, respectively) in comparison with the green-fruit phase.

I. P. Pavlov Ryazan' Medical Institute. Translated from Khimiya Prirodnykh Soedinenii, No. 2, pp. 293-294, March-April, 1987. Original article submitted November 6, 1986.

0009-3130/87/2302-0248$12.50