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UDC 547.917

About 70 species of *Cousinia*, family Asteraceae, which amount to more than 25% of the number of species in the USSR, grow in the territory of Kirghizia. We have investigated the roots of 15 species of biennial and perennial plants of this genus collected in the flowering phase. The carbohydrate compositions — mono- and oligosugars — were determined by the literature methods [2, 3] in an 80% ethanolic extract before and after hydrolysis, and the polysaccharides in hydrolysates of aqueous extracts of the same samples of raw material. Table 1 gives the sum (% on the air-dry weight of the raw material) of these substances and their ratio to the sum taken as 100%.

The total amount of carbohydrates in the biennial plants did not exceed 10%, with a predominance of oligosaccharides (72%), while in the perennial plants the sum was more than 20% with a predominance of polysaccharides (54-74%). The oligosaccharides were isolated by treatment with isopropanol of the 82% ethanolic extracts that had been evaporated to the stage of a syrup, and the polysaccharides by precipitation with isopropanol of aqueous extracts purified by Bell and Palmer's method [4]. On complete acid hydrolysis of the samples of oligo- and polysaccharides [5], paper chromatography in the butan-1-ol—pyridine—water (6:4:3) system with visualization by aniline phthalate showed zones of glucose and fructose in ratios of 1:1.5 and 1:20, respectively. The IR spectrum contained absorption bands similar to those of inulin and characteristic for a 2—1 bond [6]. The presence of glucofructans is characteristic for *Cousinia* plants.

TABLE 1

Species of plant	Date and site of collection	Sum of the mono-, oligo- and polysugars, %	% of the sum taken as 100%		
			monosaccharides	oligosaccharides	polysaccharides
	Biennial				
Cousinia fetissowii	20.VI.1982, Torken	4.38	28.77	49.77	21.46
C. speciosa	20.VI.1978, Korymdy	6.20	12.9	72.58	14.52
C. leiocephala	27.VII.1982, Chychkan	7.03	17.21	47.23	35.56
C. arachnoidea	6.VII.1981, Torken	6.20	20.65	59.52	19.83
C. microcarpa	12.VI.1982, Ters	4.59	32.68	35.95	31.37
C. ninae	11.VI.1979, Chychkan	6.22	30.97	40.10	28.93
C. tamarae	12.VI.1981, Padysha-Ata	6.23	22.31	46.87	30.82
C. omphalodes	27.VI.1976,Kurp-Sai	7.10	14.79	50.0	35.21
C. waldheimiana	7.VI.1976. Kok-Oirok	7.41	27.12	52.63	20.25
	Perennial				
C. scabrida	12.VI.1982, Ters,	15.25	10.89	28.33	60.78
C. tenuisecta	6.VI.1982, Kok-Bel'	10.63	9.22	29.82	60.96
C. radians	21.V.1979, Suzak	12.16	18.42	23.03	58.55
C. bonvalotii	14.VI.1979, Kok-Bel'	14.24	15.73	25.28	56.99
C. caesiitosa	20.VII.1980 Son-Kul'	13.89	14.18	31.25	54.57
C. umbrosa	22.VI.1979, Shamsi	18.18	8.82	16.5	74.68

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POLYSACCHARIDES OF *Eremurus*.

XIX. PECTIN SUBSTANCES OF *Eremurus*

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UDC 547.917

In preceding communications, we have characterized the pectin substances (PSs) of *E. regelii* Vved. [1]. We now give comparative information for the pectins of: *E. anisopterus* (K. et K.) Rgl. (I); *E. comosus*, O. Fedtsch (II); *E. kaufmannii* Rgl. (III); *E. korovinii*, B. Fedtsh. (IV); *E. lactiflorus*, O. Fedtsh. (V); *E. luteus*, Baker (VI); *E. olgae* Rgl. (VII); *E. sogdianus* (Rgl.) Benth. et Hook. (VIII).

The pectins were isolated from the leaves by a known method [1]. After precipitation with ethanol, they consisted of fibrous light cream-colored powders which dissolved in water to form viscous solutions. The yields were (%): (I) 8.6; (II) 7.02; (III) 7.05; (IV) 10.6; (V) 7.8; (VI) 5.2; (VII) 17.8; (VIII) 14. The values of $[\alpha]_D^{20}$ (c 0.5; H_2O) were as follows: +124° (I); +168° (II); +80° (III); +140° (IV); +200° (V); +150° (VI); +190° (VII); +196° (VIII).

To determine their monosaccharide compositions the PSs isolated were hydrolyzed (2 N H_2SO_4, 98°C 48 h), and the hydrolysates were analyzed by PC and GLC [2]. The ratios of the monosaccharides and the quantitative characteristics obtained by the titrimetric method [3] are given below:

PS	Monosaccharide ratio						Tritrimetric results, %			%
	Rha	*Ara*	*Xyl*	*Gal*	*Glc*	*Man*	K_f	K_e	λ	CH_3O
I	27	6	1,1	11,78	1	7,02	7,02	5,16	42,4	3,5
II	10,66	2,59	1	5,96	1,9	5,7	5,7	6 3	52,1	4,5
III	10,8	3	1	6,8	1,2	Сл.	9,06	4,84	34,8	3,33
IV	11,8	2,44	1	9	1,8	1,8	10,23	5,35	34,4	3,64
V	4,27	2,8	1	1,4	Сл.	Сл.	12,6	4,72	27	3,3
VI	14,4	3,65	1	13	Сл.	5,8	5,8	6,21	51	4 3
VII	9,4	3,7	1,54	6,9	1	Сл.	7,65	3,5	31,5	2,41
VIII	19	5,5	1	11,3	6,6	1,3	13	5,97	31,5	4,06

Here, K_f are the free and K_e the methoxylated carboxy groups, λ is the degree of esterification and CH_3O represents the methoxy groups. The PSs of samples (V) and (VII) were characterized by a lower degree of esterification and percentage of CH_3O.

D-Galacturonic acid residues were present in all the samples. Samples (I)-(VIII) differed little in the qualitative respect and the differences were mainly quantitative. Rhamnose, arabinose, and galactose residues predominated. There was a larger proportion of mannose residues in samples (I), (II), and (VI) than in the others.

The PSs of *E. lactiflorus* were studied in more detail. The amount of uronic anhydride determined by a standard method [4] was 67%. Mol. wt. ∿ 67,000 (viscosimetrically). Separation on DEAE-cellulose gave a neutral fraction from a phosphate eluate (0.025 M; 0.05 M; 0.5 M NaH_2PO_4) with a yield of 18%. From an alkaline eluate (0.1 N and 0.2 N NaOH), and acid fraction was obtained with a yield of 78%. A hydrolysate of the neutral fraction (2 N H_2SO_4, 98°C, 24 h) was shown by PC to contain rhamnose, arabinose, xylose, and galactose, and

Institute of the Chemistry of Plant Substances, Academy of Sciences of the Uzbek SSR, Tashkent. Translated from Khimiya Prirodnykh Soedinenii, No. 5, pp. 640-641, September-October, 1983. Original article submitted April 25, 1983.

 0009-3130/83/1905-0604$07.50