POLYSACCHARIDES OF IRIDACEAE.

III. AMOUNTS OF CARBOHYDRATES IN PLANTS OF THE GENUS Crocus AND Juno

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It has been reported previously [1] that plants of the genus Juno are rich in polysaccharides. Representatives of the genus are widely distributed in the territory of Central Asia [2] but no chemical investigation of them for the carbohydrates present has been performed. In the present paper we give information on the amount of carbohydrates in plants of the genus Crocus and Juno.

The carbohydrates were iosolated from one sample of raw material by successive exhaustive extraction with 82% ethanol, with water at room temperature and with heating, with a mixture of 0.5% solutions of oxalic acid and ammonium oxalate at 70°C, and with a 10% solution of KOH at room temperature. The accompanying protein components were eliminated from the solutions by Sevag's method [3], and the acid and alkaline extracts were dialyzed against running water and distilled water for 3 days. The polysaccharides were precipitated and reprecipitated from ethanol (1:4, v/v) dewatered with acetone, and finally dried over P_2O_5 in a vacuum desiccator.

Below we give the percentage amounts of ethanol-soluble sugars (ESSs), water-soluble polysaccharides (WSPSs), pectin substances (PSs), and hemicelluloses (HMCs) on the air-dry raw material.

Plant	ESSs	WSSs (20-23°)	WSSs *(40–45°)*	PSs *(70°)*	HMCs *(A+B)*
1. Crocus alatavicus Rgl. et Sem					
Epigeal part	14,1	1,5	2,1	3,8	6,5
Hypogeal part	20,4	1,4	2,0	2,9	10,1
2. Juno popovii Vved.					
Bulbs with roots	4,1	10,2	6,7	4,0	20,4
New roots	2,9	5,0	9,2	8,0	17,6
3. Juno nicolai Vved.					
Bulbs with roots	6,8	8,6	4,8	5,3	21,2
Leaves	4,6	7,4	1,9	7,9	10,4
4. Juno maracandica Vved.					
Bulbs	6,3	2,4	5,0	6,9	9,9
New roots	6,3	1,6	4,6	4,0	6,4
Leaves	28,3	5,6	3,4	7,0	3,3
5. Juno bucharica (Foster) Vved.					
Bulbs with roots	7,7	9,4	2,8	6,6	23,3
6. Juno warleynsis (Foster) Vved.					
Bulbs with roots	9,0	4,6	3,0	3,2	16,2
7. Juno narbuti (O. Fedtsch)					
Bulbs with roots	12,2	12,5	6,9	9,8	28,5

The amount of HMCs remained high for samples of almost all the species. The total WSPSs (extraction at 20-23°C and at 40-45°C) ranged from 7 to 19% for Juno while for the Crocus it was 3.5%. The reaction of the WSPSs with a solution of iodine and potassium iodide in the presence of a 20% solution of sodium sulfate gave the greenish-blue coloration that is characteristic for amyloids [4]. The formation of a coloration in the PSs can be ascribed to the presence of a noncovalently bound amyloid. A blue coloration with the HMCs showed the presence of starch.

The qualitative monosaccharide composition in hydrolysates of the WSPSs, PSs, and HMCs was analyzed by PC, TLC, and GLC. The ESSs contained free glucose, fructose, sucrose, and

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fructooligosaccharides. The WSPSs contained as the main monosaccharide residues glucose, xylose, and galactose, together with other sugars in trace amounts.

Thus, the WSPSs in the samples of plants investigated are amyloids and part of them is noncovalently bound with the pectin substances.

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POLYSACCHARIDES OF Primula veris

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It is known that Primula veris L. (cowslip primrose) contains a number of biologically active substances, while infusions and tinctures of the plant possess expectorant properties [1, 2]. However, its chemical composition has been studied inadequately, while the water-soluble polysaccharides (WSPSs) have not been considered previously. We have studied the accumulation and the monosaccharide composition of the WSPSs isolated from the whole plant and its inflorescences and leaves. The plants were collected in the period of mass flowering (May) in the environs of the village of Pronsk, Pronsk region, Ryazan' province, in 1983.

The air-dry raw material, previously purified with ethanol (1:10) and found (moisture content 10.0-11.3%), was extracted with hot water at 90-95°C (1:20) for 1.5 h. The extract was filtered and evaporated, and the residue was treated with 96% ethanol (1.5 volumes). The precipitate of polysaccharides (PSs) was separated off, washed with ethanol and with acetone, and was dried in vacuum over P_2O_5. Then the WSPSs were demineralized and their ash content and uronic anhydride content were determined as described in [3]. The ash content of the demineralized PSs was 0.7%. The hydrolysis of the WSPSs and the subsequent operations with them were carried out as previously [4]. The hydrolysates obtained 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 cowslip primrose consist of eight monosaccharide components: D-galacturonic acid, D-galactose, D-glucose, L-arabinose, D-xylose, L-rhamnose, and two unidentified monosaccharides chromatographically more mobile than D-xylose and L-rhamnose. The neutral sugars were determined quantitatively by the method described in [5].

The results of the investigation of the WSPSs of the cowslip primrose are given below (5):

Plant organ	Yield of WSPSs	Ash content	Amounts of the total, taken as 100%					*GalUA*
			Gal	*Glc*	*Ara*	*Xyl*	*Rha*	
Whole plant	6.6	18.8	41.90	5.82	28.17	7.20	16.91	54.5
Inflorescences	6.2	19.2	27.89	9.32	45.28	7.96	9.55	53.9
Leaves	6.5	18.7	34.80	11.21	29.03	6.99	17.97	55.0

As we see, no appreciable differences are found in the accumulation of PSs in the cowslip primrose and its individual organs or in the amounts of ash and galacturonic acid. The predominating component of the WSPSs of the whole plant and the leaves is galactose and

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