

FN-3 and FN-11 papers. The quantitative ratios of the monosaccharides were determined by the GLC method using the acetates of the corresponding aldonitriles on a Tsvet-101 instrument with a flame-ionization detector, using a steel column (200 × 0.3 cm) filled with 5% of XE-60 on Chromaton N-AW, 0.200-0.20 mesh with helium as the carrier gas (55 ml/min) at a column temperature of 210°C. The results obtained are given in Table 1.

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CARBOHYDRATES OF *Allium*.

III. CHARACTERISTICS OF THE POLYSACCHARIDES OF SPECIES OF *Allium*

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Continuing an investigation of the carbohydrates of plants of the family Alliaceae [1], we have made a comprehensive study of the amounts of all types of polysaccharides with the exception of cellulose in the bulbs of six species of *Allium* L. belonging to three botanical sections [2]. The plants of the section *Molium* Don (1, 2), those of the section *Haplostemon* Boiss (3) and those of the section *Rhiziridium* Don (4-6) were collected in 1981. From a single sample of the raw material previously treated with chloroform and 96% and 80% ethanols, we extracted successively the ethanol-soluble fraction (ES), the water-soluble polysaccharides (WSPSs), the pectin substances (PSs) [3], and the hemicelluloses A and B (HMCs) [4]. The results of the investigation are given in Table 1.

As can be seen from the table, the amounts of polysaccharides are different, the largest amounts being found in the plants of the section *Molium* Don.

In all the samples of ethanol-soluble fractions PC (water-saturated phenol, revealing agent, an ethanolic solution of urea system 1) showed the presence of fructose, glucose, sucrose, and oligosaccharides containing fructose.

The water-soluble fractions, after the elimination of protein by Sevag's method, consisted of cream-colored powders possessing no reducing capacity, giving no color reaction with iodine, readily soluble in cold water, and forming clear mobile solutions. The samples of WSPSs were subjected to complete acid hydrolysis with 0.5 N H₂SO₄ at 100°C for 2 h. In all the hydrolysates PC (system 1) showed the presence of fructose (main spot) and glucose (weak spot). Consequently, the water-soluble polysaccharides are glucofructans. The presence of glucofructans is characteristic for all the species of *Allium* studied.

Hydrolysis of the pectin substances and of the hemicelluloses was carried out with 2 N H₂SO₄ in sealed tubes at 100°C for 48 h. The hydrolysis products were identified by PC (butan-1-ol-pyridine-water (6:4:3); aniline phthalate) and quantitatively by GLC of the acetates of the corresponding aldonitriles [5] (Table 1).

Galacturonic acid was also detected by PC in all the samples of PSs.

TABLE 1. Amounts of Carbohydrate Components in the Bulbs of Some Species of *Allium* and Their Monosaccharide Compositions

Species of plant and phase of development	Type of carbohydrate	Yield, %	Monosaccharide composition						
			Fru	Rha	Ara	Xyl	Glc	Gal	GalUA
1. <i>A. elatum</i> Rgl., fruit-bearing	ES	41.0	+	—	—	—	+	—	—
	WSPSs	40.0	+	—	—	—	Tr.	—	—
	PCs	1.11	—	0.9	Tr.	2.6	1.0	4.3	+
	HMCA	0.89	—	1.0	1.4	—	—	—	—
	HMCB	0.29	—	1.0	—	—	—	—	—
2. <i>A. karataviense</i> Rgl., budding	ES	31.0	+	—	—	—	+	—	—
	WSPSs	26.2	+	—	—	—	Tr.	—	—
	PCs	3.4	—	2.05	Tr.	1.0	—	Tr.	+
	HMCA	1.7	—	1.0	—	—	—	Tr.	+
	HMCB	2.0	—	1.0	—	Tr.	—	—	—
3. <i>A. minutum</i> Vved., flowering	ES	14.1	+	—	—	—	+	—	—
	WSPSs	15.0	+	—	—	—	Tr.	—	—
	PCs	2.7	—	3.0	1.0	9.0	—	5.0	+
	HMCA	0.9	—	1.0	—	Tr.	—	—	—
	HMCB	0.65	—	1.0	—	—	—	—	—
4. <i>A. obliquum</i> L., fruit-bearing	ES	42.0	+	—	—	—	—	—	—
	WSPSs	20.0	+	—	—	—	—	—	—
	PCs	5.2	—	1.0	Tr.	0.71	0.2	15.2	+
	HMCA	0.67	—	—	1.0	2.35	—	—	—
	HMCB	2.0	—	5.7	—	1.0	—	—	—
5. <i>A. semenovii</i> Rgl., budding	ES	3.9	+	—	—	—	+	—	—
	WSPSs	29.0	+	—	—	—	Tr.	—	—
	PCs	1.8	—	2.2	3.7	4.26	1.0	Tr.	+
	HMCA	1.1	—	2.7	1.0	—	—	—	—
	HMCB	0.5	—	Tr.	1.0	—	—	—	—
6. <i>A. hymenorrhizum</i> Lab. Fl. Alt., flowering	ES	7.5	+	—	—	—	+	—	—
	WSPSs	7.5	+	—	—	—	Tr.	—	—
	PCs	1.6	—	1.9	1.0	—	—	Tr.	+
	HMCA	1.9	—	1.1	1.0	—	—	—	—
	HMCB	1.6	—	1.0	Tr.	—	—	—	—

Thus, the representatives of the *Allium* species that were studied differ by their contents of ESs, WSPSs, PSs, and HMCs and by the monosaccharide compositions of these polysaccharides. The greatest accumulation of carbohydrates was found in plants of the section *Molium* Don.

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