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POLYSACCHARIDES OF *Crataegus*.

II. POLYSACCHARIDES OF THE FRUIT OF *Crataegus meyeri*

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Continuing an investigation of the carbohydrates of plants of the genus *Crataegus* [1], we have studied the dynamics of the accumulation and the monosaccharide compositions of the water-soluble polysaccharides (WSPSs) and pectin substances (PcSs) of the fruit of *Crataegus meyeri* (Meyer's hawthorn).

The polysaccharides (PSs) from the air-dry raw material of the 1981-1982 crop collected in the Shakhbuz region of the Nakhichevan ASSR were isolated by a published method [3] and were purified by reprecipitation with acidified ethanol, dialysis through a semipermeable membrane, and treatment with KU-2 cation-exchange resin (H^+ form).

Samples of the PSs were hydrolyzed with 2 N H_2SO_4 at 100°C for 8 h. The resulting hydrolysates were neutralized with $BaCO_3$, filtered, passed through a column of KU-2 cation-exchange resin (H^+ form), concentrated, and studied by descending paper chromatography in the n-butanol—pyridine—water (6:4:3) and ethyl acetate—acetic acid—water (3:1:3) systems. The monosaccharides were revealed by treatment with aniline phthalate at 105°C for 10 min. The neutral monosaccharides in the individual samples and the amounts of galacturonic acid were determined quantitatively by literature methods [4 and 5, respectively].

Depending on the stage of ripeness of the fruit, the WSPSs and the PcSs in them accumulated differently (% on the air-dry weight):

Color of the fruit	Yield of PSs	Amount of galacturonic acid	Quantitative ratios of the sugar residues			
			arabinose	galactose	rhamnose	xylose
Water-soluble polysaccharides						
Green	11.6	39.8	43.0	1.0	—	—
Orange	12.2	42.4	4.2	2.1	Tr.	Tr.
Red	12.5	43.7	5.2	2.2	1.0	Tr.
Pectin substances						
Green	14.3	40.1	17.0	1.0	Tr.	—
Orange	10.4	48.5	8.4	1.4	Tr.	—
Red	8.7	52.8	2.0	1.7	1.0	—

The amount of WSPSs changed only slightly as the fruit ripened. However, the maximum amount of PcSs was found in the green fruit, and at the moment of complete ripeness of the fruit it had fallen by almost one half.

The quantitative monosaccharide composition of the PSs and also their quantitative ratios changed according to the state of ripeness of the fruit. The quantitative and qualitative characteristics of the PcSs from the ripe fruit were determined by the titrimetric method [6] (%): free carboxy groups, K_f — 3.50; methoxylated carboxy groups, K_e — 4.69; degree of esterification, λ — 57; content of methoxy groups, CH_3O — 3.12. Amount of galacturonic acid — 52.8%.

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The molecular weight of the PcSs was determined viscosimetrically [7] and was calculated from the equation $|\eta| = KM^L = 1.1 \cdot 10^{-5} \cdot M_W \cdot 1.22$. The weight-average molecular weight M_W of the PcSs was 47,500.

By chromatography on DEAE-cellulose it was found that the PcSs of Meyer's hawthorn were heterogeneous. As the results of the investigation showed, the pectin of the fruit of Meyer's hawthorn is similar to the pectin of the fruit of the silver hawthorn (*C. orientalis*).

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CARBOHYDRATES OF *Allium*.

V. GLUCOFRUCTAN OF *Allium cepa*

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Continuing an investigation of the carbohydrates of plants of the family *Alliaceae*, we have studied the water-soluble polysaccharides (WSPSs) of the bulbs of *A. cepa* (garden onion).

The comminuted raw material, after the elimination of ballast substances with chloroform and 96% ethanol, was subjected to extraction with 80% ethanol. Fructose, glucose, and sucrose were detected in the ethanol-soluble fraction (9.7% on the absolutely dry raw material) by paper chromatography (PC, 1-butanol—pyridine—water (5:4:3) system).

Subsequent extraction with water, elimination of protein by Sevag's method [1] and precipitation in acetone gave the WSPSs (12% of the absolutely dry raw material). They consisted of a white amorphous powder readily soluble in water at 30-40°C, similar to inulin. When subjected to gel chromatography on Sephadex G-75 (61 × 1.8 cm), the initial WSPSs proved to be polydisperse. A homogeneous fraction was isolated by preparative gel chromatography on Sephadex G-50 (45 × 3.5 cm).

Six fractions (1-6) differing in elution volume and, therefore, in molecular weight were obtained:

	1	*2*	*3*	*4*	*5*	*6*
Elution volume, ml	135	166	198	267	340	470
Yield, %	20	2	1	35	20	11
Molecular mass	5000–6000	4000	—	2100	1000	320—700
2→6-Bound fructofuranose units	61.0	105.0†	78.65	76.5‡	81.65	64.7
α-D-Glucopyranose residues	93.5 93.7	72.5	73.9	70.8	73.0	61.0
β-D-Glucopyranose residues	97.15	72.7	73.2	70.5	72.5	62.1

*Interpretation in accordance with [4].
†For units within a chain 104.85 ppm.
‡For units within a chain 76.7 ppm.

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