Thus, in an investigation of the dynamics of the accumulation of the PSs in the leaves of *E. lactiflorus* according to vegetation period it was established that the PSs accumulate mainly in the period of dormancy, and their chemical characteristics have been given.

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# CARBOHYDRATES OF *Allium*.
# X. GLUCOFRUCTANS OF *Allium karataviense*

**D. A. Rakhimov and M. A. Khodzhaeva**

UDC 547.917

Continuing a chemical investigation of the plants of the genus *Allium* [1], we have studied the groups of fructans of the onion *A. karataviense*, collected in the budding phase in the Chimkent province, KazSSR.

The carbohydrates were extracted from a single sample of the air-dry raw material by a known method involving fractional extraction successively with 80% ethanol, water, a mixture of 0.5% solutions of oxalic acid and ammonium oxalate at 70°C, and caustic soda [2].

The polysaccharide fractions were hydrolyzed, and the monosaccharides in the hydrolysates were identified by PC and TLC [2]. Glucose and oligosaccharides containing fructose were detected in an ethanolic extract (yield 31%).

The yield of water-soluble polysaccharide (WSPS) amounted to 26.2%. After the determination of protein by Sevag's method [3], the WSPS consisted of a white powder readily soluble in water and possessing no reducing capacity. According to the results of gel filtration on Sephadex G-75, the polysaccharide was polydisperse. To obtain a homogeneous fraction, an aqueous solution (10%) of the polysaccharide was precipitated with various volumes of ethanol (1:2:3). The yields of the fraction were (%): I, 2; II, 63.7; III, 15.6.

We isolated fraction II forming the bulk of the WSPS for further study. In the products of the complete acid hydrolysis of the polysaccharide the main component identified was fructose, with a very small amount of glucose. By Kolthoff's method, 98.9% of fructose was determined in the glucofructan. The glucofructan was homogeneous and had a molecular mass of 24,000, which was determined on a column of Sephadex G-75. Its IR spectrum had the following absorption bands ($cm^{-1}$): 830 (vibrations of a pyranose ring), 870 (vibrations of β-glycosidic bond), and 940 (vibrations of a furanose ring).

In the products of the Smith degradation of the glucofructan, glycerol and traces of fructose were detected with the aid of PC, which shows the possibility of both 2 → 1 and 2 → 6 glycosidic bonds between the fructofuranose residues.

It follows from the $^{13}C$ NMR spectra of the glucofructan that the polysaccharides were not a mechanical mixture of inulin and levan since there were signals with chemical shifts (ppm) of 104.7 (C-2) and 76.7 (C-4) relating to C-2 and C-4 of the adjoining units of 2 → 1- and 2 → 6-bound fructofuranose [4] residues:

| Residue | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 |
|---|---|---|---|---|---|---|
| 2-β-*D*-Fruf1- | 61,7 | 104,7 | 78,0 | 75,9<br>76,7 | 82,2 | 63,7 |
| 2-β-*D*-Fruf6- | 61,3 | 105,3 | 77,8 | 77,6 | 81,4 | 64,5 |
| 1-α-*D*-Glcp- | 93,3 | 72,2 | 73,6 | 70,4 | 71,5 | 61,0 |

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Institute of the Chemistry of Plant Substances, Academy of Sciences of the Uzbek SSR, Tashkent. Translated from Khimiya Prirodnykh Soedinenii, No. 1, pp. 110-111, January-February, 1990. Original article submitted March 29, 1989.

On the basis of the integral intensities of the signals with chemical shifts of 82.2 and 81.4 ppm, the glucofructans had 2 → 1-β- and 2 → 6-β-bound fructofuranose residues in a ratio of 1.2:1. A chemical shift of 93.3 ppm is characteristic for the signal of the anomeric carbon atom of a terminal glucopyranose residue attached to C-2 of a fructofuranose residue in the inulin part of a glucofructan.

The onions contained 3.4% of total polysaccharides (isolated by ammonium oxalate and oxalic acid) consisting of residues of galacturonic acid and of neutral sugars: rhamnose and xylose in a ratio of 2:1 with traces of arabinose and galactose.

The alkali-soluble polysaccharides consisted of hemicelluloses A and B, with yields of 1.7 and 2%, respectively. They were found to contain rhamnose, xylose, and glucose residues.

The results obtained show that a predominant amount of oligo- and polyglucofructans is characteristic for the onions *A. karataviense*. It has been shown that the glucofructan contains inulin and levan types of bond.

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# DEGRADATION OF A GLUCOMANNAN AND A MANNAN UNDER THE ACTION OF γ-RADIATION

**D. A. Rakhimov, É. Kristallovich, M. U. Sadykov,**
**and M. Kh. Malikova**

UDC 547.917

The extensive development of atomic energy and the continuous expansion of fields of use of ionizing radiation (IRs) in the national economy is attracting particular attention to the investigation of the processes of the radiation degradation of high-molecular-mass compounds.

The actions of IRs on cellulose, starch, carboxymethylstarch, dextran, and pectin has been considered in [1-3]. The degradation of linear polysaccharides under the action of γ-radiation has been studied to the smallest degree up to the present time.

The aim of our work was to investigate the radiation degradation of natural linear polysaccharides and to study radioisotopes from the point of view of their use in hematology. Linear polysaccharides natively acetylated in plants were investigated: a mannan from *Ungernia ferganica* Vved. [4] and a glucomannan from *Eremurus regelii* [5], which have β-1—4 glucosidic bonds. The mannan and the glucomannan were dissolved in water and the solutions were subjected to γ-irradiation in glass bottles with doses of from 0 to 4.0 Mrad in a RKh-γ-30 apparatus at a dose rate of 40.3 r/sec (NIIKhTTs of Minmedbioprom). The relative viscosities were measured in an Ostwald viscometer at 20°C. The results of analysis are given in Table 1.

It can be seen from Table 1 that the radiolysis of aqueous solutions of the mannan and the glucomannan was accompanied by a fall in the viscosities of the solutions and in the yields of polysaccharides, i.e., the process of degradation was predominant.

When the mannan and the glucomannan were irradiated in the solid state (in the form of powders in glass bottles) with a dose of 4 Mrad for 24 h, a degradation process was again observed. The relative viscosities of 1% solutions before radiolysis

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Institute of Chemistry of Plant Substances, Academy of Sciences of the Uzbek SSR, Tashkent.

Translated from Khimiya Prirodnykh Soedinenii, No. 1, pp. 111-113, January-February, 1990. Original article submitted March 21, 1989.

0009-3130/90/2601-0090$12.50