CARBOHYDRATES OF Allium.

XII. STRUCTURE OF A GLUCOFRUCTAN FROM THE LEAVES OF Allium suvorovii

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Continuing an investigation of the structures of glucofructans from plants of the genus Allium [1, 2], we have studied a glucofructan from the leaves of A. suvorovii Rgl as the most widespread species.

The water-soluble polysaccharides (WSPSs), isolated with a yield of 7.4% by a method described previously [1], were polydisperse. The initial WSPSs from A. suvorovii leaves (Table 1) were fractionated on a column of Sephadex G-50, and five fractions were obtained (GF-I–GF-V). Fraction GF-IV was homogeneous and had a molecular mass of 1100, determined by gel chromatography on a column of Sephadex G-75. The acid hydrolysis of fraction GF-IV gave 85.7% of fructose and 14.3% of glucose, determined by Kolthoff's method [3]. Such a composition of the sugars corresponds to a heptasaccharide. It was subsequently characterized by ^{13}C NMR spectroscopy (Table 1).

It can be seen from Table 1 that GF-IV contained both 2 → 1- and 2 → 6-bound fructofuranose residues. This is shown by a peak at 104.5 ppm, relating to C-2 of an abutting fructofuranose, i.e., when 2 → 1- and 2 → 6-bound fructose residues are side by side. According to the integral intensities of the signals with chemical shifts on 82.25 and 81.25 ppm, the heptafructooligosaccharide had 2 → 1- and 2 → 6 β-bound fructose residues in a ratio of 1.5:1.0. The glucopyranose had the α-configuration and was attached to fructose at C-2, i.e., it formed a sucrose fragment, as was shown by a peak at 93.5 ppm, which is characteristic for this type of bond.

The ^{13}C NMR spectrum was taken on a Bruker WR-60 instrument with a working frequency for carbon of 15.08 MHz, with complete proton suppression. Solutions in D_2O with a concentration of 3% were prepared with methanol as internal standard, the shift of the signal of which relative to TMS was taken as 50.15 ppm. Chemical shifts are given in the δ scale.

On the basis of the ^{13}C NMR spectrum, we may propose the most probable structure (I) for the heptafructooligosaccharide:

TABLE 1. Chemical Shifts of the Carbon Atoms in the ^{13}C NMR Spectrum of the Heptafructooligosaccharide from A. suvorovii

Residue	C-1	C-2	C-3	C-4	C-5	C-6
2 → 1 bound fructofuranose residues	63,3	104,5 105,7	78,1	76,0	82,25	83,3
2 → 6 bound fructofuranose residues	61,1	105,0	78,4	76,2	81,25	64,3
α-D-Glucopyranose residues	93,5	72,4	73,8	79,8	73,0	61,5

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