BRIEF COMMUNICATIONS

POLYSACCHARIDES OF Eremurus

D. A. Rakhimov, M. I. Igamberdieva,
Kh. A. Arifkhodzhaev, and Z. F. Ismailov

UDC 547.941

Continuing a study of the chemical composition of the polysaccharides of Eremurus (desert candle) [1, 2] we have investigated six species of Eremurus for their contents of water-soluble polysaccharides (PS) and pectin compounds (PC). The dried and comminuted raw material was treated with methanol to extract coloring matters and low-molecular-weight compounds. The PS were extracted with water [3], and the PC from the residual material [4] (Table 1).

It can be seen from the table that representatives of the different sections are characterized by different amounts of PS of different compositions.

The water-soluble polysaccharide from E. altaicus is a white amorphous powder readily soluble in water, $[\alpha]_D^{22} -35.0°$ (c 1.0; water) and giving a red coloration with iodine. On ultracentrigugation (MOM-3170) its solutions show a single peak ($S = 1.43 \cdot 10^{-13}$ sec, 50,000 rpm, temperature 20°C, c 5.0; 10 mg/ml, rate of throughput 5 min) and mol. wt. 51,000 ± 5,000. The yield of polysaccharide purified via the copper complex was 82.5%. Its IR spectrum, cm^{-1}: 820, 890, 1520, 1650, 3200-3400. On acid hydrolysis, the polysaccharide gave glucose and mannose in a ratio of approximately 1 : 2.6, as was determined by the ebulliostatic [5] and GLC methods. The mannose was identified in the form of the phenylhydrazone, mp 188-189°C, $[\alpha]_D^{22} +26.0°$ (c 0.5; pyridine), and the glucose by its conversion into the osazone, mp 203°C. A chromatographic analysis of the products of the partial hydrolysis of the purified polysacchardie showed the presence of four oligosaccharides consisting of glucose and mannose. Thus, the glucomannan from E. altaicus is similar to the polysaccharides from E. regelii and E. turkestanicus [1, 2].

TABLE 1. Amounts of PS and PC in the Tuber Roots of Some Species of Eremurus (% on the weight of the air-dry raw material)

Plant	Phase of development	Site and time of collection	Polysaccharides: pectin compounds	Polysaccharides: water-soluble	Composition of the water-soluble PS
Subdivision Eueremurus Boiss					
E. altaicus (Pall.)	Budding	Dzhungarian Ala-Tau, TadzhSSR 1.VI 1972	12,9	22,3	Glucose–mannose
E. turkestanicus (Rgl.)	Beginning of dormancy	Chimgan (Western Tien-Shan) 13.VIII 1972	6,1	15,4	Glucose–mannose
Subdivision Henningia Boiss					
E. anisopterus Rgl.	Flowering	Bukhara oblast IV 1973	6,6	0,9	
E. roseolus (Vved.)	Flowering	Environs of village of Sagridasht, Tadzh SSR 20.VI 1972	6,2	0,42	Arabinose–galactose
E. stenophyllus (Bofss et Bushe)	Green fruit	Gorge of R. Gul'ob, Uzbek. SSR 26.VI 1972	3,5	0,33	
E. robustus Rgl.	Flowering	Chimgan 12.VI 1973	1,1	0,26	

Institute of the Chemistry of Plant Substances, Academy of Sciences of the Uzbek SSR. Translated from Khimiya Prirodnykh Soedinenii, No. 4, pp. 511-512, July-August, 1974. Original article submitted December 18, 1973.

The pectin isolated from the leaves of E. turkestanicus, after reprecipitation with ethanol, demineralization, and drying, consisted of a cream-colored powder containing 63.8% of a uronic anhydride, 4.07% of $-OCH_3$, traces of N, and 2.5% of ash; its moisture content was 10.1%. A 0.5% solution of the pectin formed a viscous colloidal suspension. From its viscosity characteristic, $\eta_{rel} = 9.8$; $\eta_{sp} = 8.8$, $[\eta] = 4.3$, it follows that the pectin studied is similar to citrus pectin [6]. In an acid hydrolyzate of the PC we found chromatographically (on paper and TLC) galacturonic acid, galactose, arabinose, xylose, and rhamnose. The D-galacturonic acid was isolated through its barium salt and was identified by its IR spectrum [7]. Saponification of the pectin substances gave pectic acid (88.0%), $[\alpha]_D^{22} + 196.0°$; (c 0.5; water) among the products of hydrolysis of which by paper chromatography we found galacturonic acid and the same monosaccharides. Thus, it has been shown that the carbohydrate chain of the pectin of E. turkestanicus consists of partially methylated polygalacturonic acid and neutral sugars.

LITERATURE CITED

1. D. A. Rakhimov, M. I. Igamberdieva, and Z. F. Ismailov, Khim. Prirodn. Soedin, 423 (1973).
2. M. I. Igamberdieva, D. A. Rakhimov, and Z. F. Ismailov, Khim. Prirodn. Soedin., No. 4, 429 (1974).
3. B. N. Stepanenko et al., Dokl. Akad. Nauk SSSR, 111, 652 (1956).
4. E. M. Afanas'eva, Rast. Res., 8, 192 (1972).
5. V. K. Nizovkin and I. Z. Emel'yanova, Zh. Prikl. Khim., 32, 2516 (1959).
6. S. L. Kovalenko and O. D. Kurilenko, Ukr. Khim. Zh., 31, 175 (1965).
7. N. P. Shelukhina, I. I. Turdakova, and G. B. Aimukhamedova, Galacturonic Acid: Methods for Its Isolation and Determination [in Russian], Frunze (1972), p. 40.