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BRIEF COMMUNICATIONS

POLYSACCHARIDES FROM SEEDS OF PLANTS OF THE FAMILY Fabaceae

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Polysaccharides comprise the greater part of plant biomass and fulfill various functions, the most important of which is the use of them by living cells as energy reserves. We studied water-soluble polysaccharides (WSPS) from seeds of several plants of the family Fabaceae growing in Uzbekistan.

Seeds of greater than 23 species of plants from the family Fabaceae were investigated for WSPS content. Plants belonging to this family are known from the literature to contain mainly galactomannans as the WSPS [1–3].

The goal of the screening was to determine the distribution of galactomannans among local representatives of plants of the family Fabaceae and to determine the monosaccharide composition and physicochemical properties [3, 4].

In order to isolate WSPS, seeds were ground, sieved through a sieve with 2-mm openings, and inactivated by refluxing $CHCl_3$:MeOH (1:1). The remaining raw material was extracted with cold H_2O (3×, 1:5 ratio). The extracts were evaporated and precipitated by three times the volume of EtOH. The resulting precipitate was separated by centrifugation, washed with EtOH, defatted with acetone, and dried in vacuo over P_2O_5. Table 1 presents the WSPS content and their monosaccharide compositions. Of the three subfamilies included in the Fabaceae famly (Faboideae, Mimosoideae, and Caesalpiniodeae), the highest level of WSPS was observed in general in several seeds of plants from the first and last subfamilies.

The WSPS content in the seeds varied from 0.3% (*Cercis canadensis* L.) to 15% (*Crotalaria alata*). WSPS were observed mainly in seeds of plants of the genus *Colutea* (11%), *Gymnogladus dioca* (13.2%), and the genus *Astragalus* (14.6%).

The isolated WSPS were amorphous white powders with a cream tint. They were soluble in water, formed viscous solutions with specific viscosity indices 3.8-40.3, and gave a positive reaction with Fehling solution [5]. However, WSPS from *Arahis hypogaea* L., *Linum culinaris* Medik, *Alhagi pseudalhagi* (WB) Desv., and *Cercis canadensis* L. did not form viscous solutions upon dissolution in water. The monosaccharide arabinose dominated the WSPS from seeds of these plants; glucose, those from *C. canadensis* L. and *Vexibia pachycarpa* C. A.

The monosaccharide composition of the WSPS was established using total acid hydrolysis (H_2SO_4, 2 N, 8 h, 100°C). The hydrolysates were studied by PC (BuOH:Py:H_2O, 6:4:3; anilinium acid phthalate detection) and GC as the aldononitrile acetates [6]. Galactose and mannose were mainly identified in the hydrolysates of the aforementioned WSPS. However, the ratio of galactose and mannose varied greatly. The dominant monosaccharide was mannose (Table 1). Therefore, plants of the genera *Colutea*, *Crotalaria*, *Cassia*, and *Astragalus* were sources of galactomannans.

Thus, the distribution of WSPS among representatives of the family Fabaceae was studied. It was established that seeds of various local plant species of the family Fabaceae may or may not contain galactomannans. The results supplement chemical signatures of representatives of this family for galactomannan content.

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TABLE 1. Content and Monosaccharide Composition of Water-Soluble Polysaccharides from Plant Seeds of the Family Fabaceae

Subfamily, species	Yield, %	Monosaccharide ratio						
		Rha	Xyl	Ara	Man	Glc	Gal	Gal:Man
Subfam. Faboideae								
Astragalus sieversianus Pall.	2.2	–	1.0	–	5.6	–	4.9	1:1.1
Astragalus sp.	14.0	–	–	1.6	3.4	8.4	3.2	1:1
Astragalus nuciferus L.	14.6	–	Tr.	1.2	7.2	1.0	3.8	1:1.9
Arachis hypogaea L.	4.7	1.2	3.4	4.2	1.0	Tr.	1.0	1:1
Cicer sativum L.	1.0	1.0	–	–	2.5	5.0	5.6	1:2.4
Halimodendron halodendron (Pall) Voss.	0.4	1.0	1.0	–	7.2	6.6	6.0	1:1.2
Linum culinaris Medik	2.6	–	Tr.	1.8	1.0	–	–	–
Onobrynchis pulchella Schrenk.	0.6	–	1.0	1.3	1.2	–	–	–
Phaseolus aureus Roxb.	2.6	–	2.6	1.0	6.0	–	4.8	1:1.25
Phaseolus vulgaris L.	1.3	1.4	1.8	1.0	1.0	3.7	11.0	1:11
Vexibia pachycarpa C.A.	0.3	3.0	2.2	3.0	1.0	4.0	1.1	1:1.1
Vexibia alopecuroides L.	0.4	2.5	–	6.0	5.1	5.1	1.0	1:5
Vicia tetrasperma (L.) Moench	0.5	–	–	2.4	2.8	4.2	1.7	1:1.6
Medicago sativa L.	3.7	–	–	1.0	4.1	1.2	2.2	1:1.8
Crotalaria alata L.	15.0	1.0	–	–	18.4	–	2.6	1:7.1
Glycine hispida (Mnch).	0.5	1.0	–	Tr.	–	–	3.9	–
Colutea orbiculata Sumn.	7.6	1.0	–	1.0	7.2	6.6	6.0	1:1.2
Colutea paulsenii Freyn.	11.0	–	–	1.0	15.4	–	20.0	1.3:1
Alhagi pseudalhagi (MB) Desv.	2.8	1.8	1.7	6.6	1.0	–	2.0	2:1
Subfam. Mimosoideae								
Albizzia julibrissin Durazz	0.4	1.3	–	1.0	3.6	–	1.8	1:2
Subfam. Caesalpiniodeae								
Cassia angustifolia Vahl	5.6	–	–	–	1.5	–	1.0	1:1.5
Gymnocladus dioca (L.) Koch	13.2	–	–	–	2.7	–	1.0	1:2.7
Cercis canadensis L.	0.3	1.0	1.1	2.1	2.2	5.0	1.8	1:1.2

Tr.: traces.

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