

BRIEF COMMUNICATIONS

CARBOHYDRATES FROM *Trigonella foenum-graecum*

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The introduced plant *Trigonella foenum-graecum* L. (Fabaceae) growing in the north Caucasus (Caucasus Mineral Waters region) was investigated.

The aerial part of the plant is a source of valuable biologically active compounds. Our phytochemical studies revealed the presence in various raw material samples (seeds/herb, %) of steroidal saponins (5.2/2.3), fatty oil (5.7/3.8), protein (3.84/28.12), and polysaccharides (23.0/18.5) [1].

Herein we communicate results from investigations of the carbohydrates isolated from *T. foenum-graecum* seeds.

Ground and air-dried raw material (seeds) was worked up with $\text{CHCl}_3:\text{CH}_3\text{OH}$ (1:1) to extract pigments and lipids. Then, the remaining raw material was extracted successively with water to isolate water-soluble polysaccharides (WSPS); ammonium oxalate solution, pectinic substances (PS); and alkali solutions (10 and 18%), hemicellulose HC-A and HC-B, respectively. The polysaccharide extracts gave a negative reaction with iodine for starch. Polysaccharides were precipitated from the extracts with alcohol. Table 1 gives the polysaccharide content, from which it can be seen that *T. foenum-graecum* seeds contain mostly PS (8.4%) and HC-A (11.6%). The monosaccharide composition of the polysaccharides was determined by total acid hydrolysis (H_2SO_4 , 2 N; 100°C for 8 h, WSPS; 42 h, PS; 72 h, PC) [2]. Sugars were identified using PC and GC.

PC was carried out on Filtrak F No. 15 paper using *n*-butanol:pyridine:water (6:4:3) with development by anilinium acid phthalate. The quantitative composition of the monosaccharide units in the polysaccharides was studied by GC as the aldonitrile acetates [3]. Chromatograms were recorded on a Chrom-5 chromatograph with a flame-ionization detector, stainless-steel column (200 × 0.3 mm), OW 225.5%, inerton NAW 0.16 × 0.20 mm, gas flow rate 40 mL/min, column temperature 210°C, N_2 carrier gas.

WSPS were a light cream-colored powder that was very soluble in water. The predominant monosaccharides in the WSPS were mannose and galactose in a 2:1 ratio. Therefore, the WSPS was a galactomannan.

The PS were an amorphous cream-colored powder that dissolved in water to form a thick viscous solution. PC identified galacturonic acid in the PS in addition to those monosaccharides shown in Table 1.

HC was a light brown-colored powder. The monosaccharide composition included galactose, glucose (trace), mannose, arabinose, xylose, and rhamnose. HC-A and HC-B differed only quantitatively in monosaccharide-unit contents.

Based on the results of the study of the carbohydrate components of *T. foenum-graecum*, WSPS and HC-B can be considered very promising as sources of galactomannans and for pharmacological investigations.

TABLE 1. Content and Monosaccharide Composition of Carbohydrates from *Trigonella foenum-graecum* Seeds

Polysaccharide	PS yield, %	Ratio of monosaccharide units					
		Rha	Xyl	Ara	Man	Gal	UAc
WSPS	7.8	-	-	1.0	22.7	10.6	-
PS	8.4	2.7	1.3	1.0	13.7	8.7	+
HC-A	11.6	2.0	2.0	1.0	31.0	26.0	-
HC-B	6.3	4.6	3.6	1.0	42.5	24.6	-

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