

CARBOHYDRATES FROM *Ajuga turkestanica*

I. T. Abdukadirov, M. A. Khodzhaeva,
M. T. Turakhozhaev, and A. U. Mamatkhanov

UDC 547.917

Two species of *Ajuga* grow in Uzbekistan. Of these, we studied *A. turkestanica* Rgl. (Labiatae).

The aerial part of the plant is a source of biologically active compounds such as ecdysteroids [1] and iridoids [2] that have anabolic activity and cholagogic action.

The present article contains results from investigations of carbohydrates isolated from the aerial part of *A. turkestanica* during vegetation in Surkhandar'ya district.

Literature methods [3] were used to study the carbohydrates. These consisted of removal by CHCl_3 of lipophilic substances (LS, 6.75%), successive isolation by ethanol (80°) of sugars soluble in alcohol (SSA, 7.5%) and water-soluble polysaccharides (WSPS, 4.9%), and isolation of pectinic substances (PS, 4.5%) by oxalic acid solution (0.5%).

Solutions of LS and SSA were evaporated to dryness in vacuum in a rotary evaporator. WSPS and PS solutions were condensed and precipitated with ethanol.

WSPS are a light cream-colored powder that is very soluble in water and forms yellowish solutions that do not give a color with iodine solution (0.1 N).

PS are cream colored and form a viscous solution of relative viscosity 5.72 (c 0.5, H_2O).

The monosaccharide composition was determined by acid hydrolysis of WSPS and PS (0.5 g each) using H_2SO_4 (2 N, 100°C, 8 h and 36 h, respectively).

Paper chromatography (PC) using butanol:pyridine:water (6:4:3) with anilinium phthalate and alcoholic urea (5%) as developers identified the monosaccharides of the SSA and WSPS and PS hydrolysates.

PC of the SSA fraction detected glucose, fructose, and saccharose; of the WSPS hydrolysate, glucose and fructose; of the PS hydrolysate, galacturonic acid, galactose, glucose, and arabinose.

The IR spectrum of the WSPS showed absorption bands at 3692, 3320, 1420, 1750, 1604, 1146, 940, and 834 cm^{-1} . These are characteristic of a 2→1 bond [4] and similar to absorption bands of inulin.

Thus, WSPS of *A. turkestanica* Rgl. belong to inulin-type glucofructans.

The IR spectrum of PS contains absorption bands at 1150 (esterified carboxylic acid) and 815, 870, and 910 cm^{-1} (triplets of pyranose rings) that are consistent with the presence of 1,4 bonds with predominance of α -glycosidic bonds between galacturonic acid and monosaccharides [5].

The molecular weight of the pectin, 50,450, was determined by viscometry [6]. Titrimetry of the pectin was performed as before [7]: K_c , free carboxylic acids (3.88%); K_e , esterified carboxylic acids (1.75%); degree of esterification, 30.7%. The uronic anhydride content (45.6%) was measured as before [8].

REFERENCES

1. Z. Soatov, V. N. Syrov, A. U. Mamatkhanov, and N. K. Abubakirov, *Khim. Prir. Soedin.*, 152 (1994).
2. L. D. Kotenko, M. R. Yakubova, A. U. Mamatkhanov, Z. Soatov, and M. T. Turakhozhaev, *Khim. Prir. Soedin.*, 685 (1993).
3. M. A. Khodzhaeva, M. Khasanov, E. S. Kondratenko, and A. U. Umarov, *Khim. Prir. Soedin.*, 14 (1985).
4. L. M. Verstraeten, *Anal. Chem.*, **36**, 1040 (1964).

S. Yu. Yunusov Institute of the Chemistry of Plant Substances, Academy of Sciences of the Republic of Uzbekistan, Tashkent, fax (99871) 120 64 75. Translated from *Khimiya Prirodnikh Soedinenii*, No. 1, p. 75, January-February, 2004. Original article submitted December 4, 2003.

5. M. P. Filippov, *Infrared Spectra of Pectinic Substances* [in Russian], Shtiintsa, Kishinev (1978), p. 21.
6. S. L. Kovalenko and O. D. Kurilenko, *Ukr. Khim. Zh.*, **31**, No. 2, 175 (1965).
7. G. V. Buzina, O. F. Ivanova, and L. B. Sosnovskii, , **4**, 15 (1965).
8. M. N. Zaprometov, ed., *Biochemical Methods of Plant Analysis* [in Russian], Izd. Inostr. Lit., Moscow (1970), p. 296.

Copyright of Chemistry of Natural Compounds is the property of Kluwer Academic Publishing / Academic and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.