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BRIEF COMMUNICATIONS

CARBOHYDRATES OF *Calendula officinalis*

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Pot marigold *Calendula officinalis* is used in folk medicine and is approved for use in scientific medicine [1], and it is also a source of food dyes. An alcoholic extract of an infusion of the flowers of *Calendula officinalis* is used as a bactericidal and antiphlogistic agent. The medicinal properties and absence of information on the carbohydrate composition of pot marigold has determined the scientific and practical importance of a study of the monosaccharide compositions of its inflorescences and stems.

When the finely ground raw material was extracted with aqueous ethanol, low-molecular carbohydrates were isolated. Only glucose was present in the water-soluble carbohydrates (WSCs) of the inflorescences and stems. Pectin substances (PSs) were isolated from the residual raw material. The yields and characteristics of the WSCs and PSs are given below

Type of raw material	Extractant	Yield of WSCs, %	Extractant	Yield of PSs, %
Inflorescences	70% ethanol	51,3	0,5% $H_2C_2O_4$	4,2
Inflorescences	70% ethanol	51,8	0,1 н.HCl	11,0
Inflorescences	Distilled water	68,0	Mixture of 0.5% solutions of $H_2C_2O_4$ $(NH_4)_2C_2O_4$	5,6
Stems	Distilled water	21.2	Mixture of 0.5% solutions of $H_2C_2O_4$ и $(NH_4)_2C_2O_4$	4,4

The pectin substances that had been isolated were purified by reprecipitation with alcohol from aqueous solutions. The purified PSs formed a light cream-colored powder.

The physicochemical characteristics of the pectins were determined by the titrimetric method [5], and their molecular masses by sedimentation analysis [6]. The presence of ash in the PSs was due mainly to the presence of iron (9.3—63.5 mg/liter) and calcium (0.37—37.4 mg/liter):

Pectin substances	Specific rotation $[\alpha]_D^{20}$ (H_2O, 0,5%)	Degree of esterification	GalA content, %	Mol. mass	Ash, %
Stems	+190°	28,5	33,6	54000	6,7
Inflorescences	+220°	31,1	35,0	53000	4,2

The characteristics of the pectins given above were completed by a study of their IR absorption spectra [7]. The absorption bands in the IR spectra of the PSs of the stems and of the inflorescences were very similar and in the discussion below they will be treated together.

A region of absorption in the IR spectrum at 1030—1040 cm^{-1} showed the presence in them of pyranose rings, which are the basis of the pectins [8]. Absorption in the 1770—1780 cm^{-1} region was probably connected with the stretching vibrations of a methoxycarbonyl group, while bands at 1620—1640 and 1440 cm^{-1} were those of an ionized carboxyl. An absorption band at 980 cm^{-1} reflected the out-of-plane deformation vibrations of methyl and methylene groups.

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The monosaccharide compositions of hydrolysates of the PSs (2 N H_2SO_4, 72 h) were represented by the following sugars: rhamnose, galactose, and galacturonic acid (stems), and rhamnose, galactose, glucose, and galacturonic acid (inflorescences). The identification of the monosaccharides of the WSCs and PSs was carried out as in [9].

Thus, the carbohydrate composition of *Calendula officinalis* consists of free glucose and pectin substances with a low degree of esterification.

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