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B R I E F C O M M U N I C A T I O N S

POLYSACCHARIDES OF PLANT TISSUE CULTURE. III. POLYSACCHARIDES OF *Codonopsis clematidea* CALLUS CULTURE

D. A. Rakhimov, E. Sh. Salimova, and R. P. Zakirova

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The Central Asian species *Codonopsis clematidea* (Schrenk) C.B. Clarke (clematis Asian bell) Campanulaceae is a perennial herbaceous plant that is widely used in medicine as a cholagogue for hepatitis and cholecystitis (medicinal collection).

We investigated the aerial part and callus tissue of *C. clematidea* to determine the possibility of producing polysaccharides.

Tissue culture was prepared using *C. clematidea* leaves. The separate organs were treated with ethanol (70%) for 3-5 s and diacid solution (0.1%) for 20 min and washed with sterile water. The explants were set onto the surface of agarized nutrient medium. The mineral part was calculated as before [1]. Vitamins and phytohormones were added [2]. Tissue was grown at 26±2°C and lighting of 5000-7000 lux with 16-h illumination.

Successive extraction with water, ammonium oxalate, and base isolated four polysaccharide fractions. The monosaccharide composition of the polysaccharides was determined as before [3].

A comparison of the carbohydrate fragments of the plant and biomass revealed both common and distinguishing features. The callus-tissue biomass contains twice as much water-soluble polysaccharides (WSPS) as the native plant, 3.15 and 1.21%, respectively (Fig. 1). The yields of pectinic substances (PS) and hemicellulose (HMC-A and HMC-B) in the plant and biomass are approximately equal.

Then we studied only the callus-culture polysaccharide fractions. The polysaccharides are powdery light fibrous materials that are practically insoluble in organic solvents. They melt with decomposition at 260-310°C.

The monosaccharide composition of the polysaccharides was studied by total acid hydrolysis and analyzed by paper chromatography and GC [3]. The results (Table 1) showed that the tissue-culture polysaccharides differ in the nature and ratio of monosaccharides.

Galactose and arabinose dominate in the WSPS; neutral sugars rhamnose and galactose, in the pectin. The base-soluble polysaccharides, hemicelluloses, occur in much greater quantities in tissue culture than other polysaccharides. Xylose and glucose dominate in the hemicelluloses.

Thus, polysaccharides of *C. clematidea* callus culture contain mainly WSPS and pectin.

TABLE 1. Monosaccharide Composition of *Codonopsis clematidea* Callus-Tissue Polysaccharides

Polysaccharides	Monosaccharides, %					
	Rham	Ara	Xyl	Man	Glc	Gal
WSPS	1.3	13.0	1.8	-	-	80.0
PS	48.3	13.8	-	-	-	37.9
HMC-A	9.1	29.6	37.6	3.1	12.5	8.1
HMC-B	3.6	9.8	28.6	4.0	36.2	18.8

S. Yu. Yunusov Institute of the Chemistry of Plant Substances, Tashkent, fax (99871) 120 64 75, e-mail: cnc@icps.org.uz. Translated from Khimiya Prirodnykh Soedinenii, No. 1, pp. 40-41, January-February, 2003. Original article submitted January 20, 2003.

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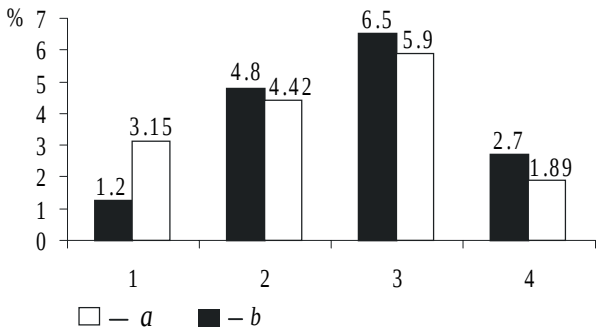

Fig. 1. Polysaccharide content in callus tissue of the aerial part of *Codonopsis clematidea*. WSPS (1), PS (2), HMC-A (3), HMC-B (4); plant polysaccharides (a), callus-tissue polysaccharides (b).

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