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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 TISSUES. II. POLYSACCHARIDES OF *Ruta graveolens* CALLUS CULTURE

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In continuation of a study of polysaccharides in plant-tissue culture [1], we analyzed the carbohydrates of *Ruta graveolens* L. callus tissue (CT). Common rue is widely used in folk medicine [2-4]. The chemical composition except for the carbohydrates has been studied in detail [5-8].

Herein we present results of a study of the carbohydrate composition of the aerial part and CT biomass of *Ruta graveolens* L.

Ruta graveolens L. cultivated on the experimental plot of the Scientific-Production Center "Botanika" of the Academy of Sciences of the Republic of Uzbekistan was collected during fruiting. The literature method [9] was used to prepare and grow CT culture. The CT was grown on Murasighe and Skoog medium [10] with added saccharose (30 g/L), mesoinositol (100 mg/L), thiamine hydrochloride (0.4 mg/L), and agar (0.7 g/L). Indoleacetic acid (1 mg/L) and kinetin (0.5 mg/L) were used as phytohormones. The cultivation was performed in a controlled environment chamber at 26±2°C, 70% humidity, 3-4 klx (16 h light + 8 h dark). We analyzed 40-45-day CT in the second and third transition. The aerial part and tissue culture of common rue were treated with alcohol (82°) to remove alcohol-soluble substances, pigments, and low-molecular-weight compounds.

The remainder of the plant and CT biomass were washed successively with water, oxalate buffer, and base. Polysaccharides were precipitated from the extracts by alcohol to give water-soluble polysaccharides (WSPS) from the aqueous extract, pectinic substances (PS) from the buffer solution, and hemicellulose-A (HC-A) and -B (HC-B) from the base solution.

The results for the contents of carbohydrates indicate that the amounts of WSPS and PS in the plant and biomass are approximately equal (Fig. 1). The plant contains twice as much HC-A as the biomass whereas the CT has 2.3 times as much HC-B.

Polysaccharides were hydrolyzed by H_2SO_4 (2 N) at 100°C in 8-24 h. The solutions were treated with $BaCO_3$ until neutral, centrifuged, evaporated, and analyzed by paper chromatography and GC [11].

The monosaccharide composition of the polysaccharides shows that xylose and glucose dominate in the hydrolyzed WSPS from the plant; galactose and mannose, from the biomass (Table 1). Mannose was not detected in the hydrolyzed WSPS from the plant. PS from CT and the plant contain mainly galacturonic acid and the sugars rhamnose, arabinose, glucose, and galactose in addition to xylose from the plant.

Glucose dominates among the monosaccharides in pectin from CT biomass. Its presence is not related to the starch content.

HC from the plant contains mainly xylose. This is consistent with the predominance of xylan in the base-soluble polysaccharides.

However, glucose dominates in the hydrolyzed HC from the CT biomass.

The results confirm that the chemical compositions of the polysaccharide fractions from *R. graveolens* L. biomass culture tissue and the aerial part of the native plant differ significantly.

The chemical compositions of the polysaccharides show that the WSPS and PS differ in monosaccharide composition and ratio.

The cell culture produces WSPS, PS, and HC, for which glucose and galactose dominate in the hydrolysates.

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TABLE 1. Monosaccharide Composition of Polysaccharides in *Ruta graveolens* L. Plant and Callus Tissue

Polysaccharides	Monosaccharides, %					
	Rham	Ara	Xyl	Man	Glc	Gal
			Plant			
WSPS	1.1	0.8	82.2	-	10.4	5.5
PS	22.3	21.3	28.9	-	10.7	16.4
HC-A	-	-	96.7	-	3.3	-
HC-B	3.1	3.1	54.8	4.6	24.8	9.6
			Callus tissue			
WSPS	2.7	6.5	1.5	11.0	10.3	68.0
PS	5.1	5.9	-	-	70.7	18.3
HC-A	7.0	9.8	7.0	-	65.7	10.5
HC-B	Tr.	1.4	10.1	4.5	71.6	12.4

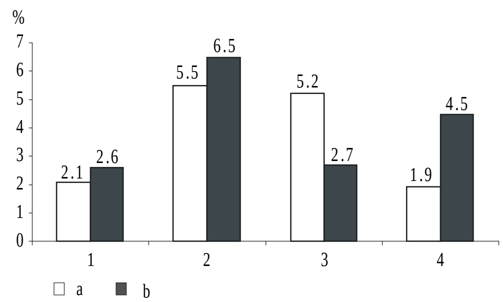

Fig. 1. Polysaccharide content in plant (a) and callus tissue (b): WSPS (1), PS (2), HC-A (3), HC-B (4).

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