PHOSPHOLIPIDS OF THE COTTON PLANT OF VARIETY S-6029

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We have isolated the phospholipids from the comminuted kernels of the seeds of the thin-fibered cotton plant of variety S-6029 (grown on a background infected with wilt) by the method described previously [1]. Homogeneous fractions of PChs, PEs, PIs, lyso-PChs, and the unidentified substances X_1, X_2, X_3, and X_4 were obtained. Their glycerophospholipid structure was confirmed by IR spectroscopy, by phosphorus determinations, and by the products of acid and alkaline hydrolysis.

The dominating fatty acids for all the phospholipids have the 16:0 composition among the saturated acids and the 18:2 composition among the unsaturated acids. The positional distribution of the fatty-acid radicals in the molecules of the main phospholipids – the PChs, the PEs, and the PIs – were determined by the enzymatic hydrolysis with phospholipase A2 of the venom of the Azerbaidzhan kufi [2] (Table 1).

The results obtained permitted the possible molecular compositions of these phospholipids to be calculated [2], and this showed that the main molecular varieties are as follows: 16:0–16:0, 16:0–18:1, 16:0–18.2, 18:1–18:1, 18:1–18:2, 18:2–18:1, 18:2–18:2 and 18:0–18:0. The percentages of single-acid unsaturateds (U–U) were: PChs 27.8, PEs 27.8, and PIs 9.6; of saturateds (S–S) 1.6, 1.9, and 3.9; of U–S 3.7, 2.4, and 1.7; of U–U' 26,8, 12.3, and 6.7; of S–U 39.3, 53.9, and 73.6; and of S–S' 0.8, 1.7, and 4.7, respectively.

In the phospholipids of the seeds investigated, in comparison with those grown on a healthy background, a slight increase in the total unsaturation in the PChs and a fall in the unsaturation in the PEs was observed, while there were no appreciable changes in the overall fatty-acids composition of the PIs.

We obtained the seeds in the G. S. Zaitsev Institute of Cotton Breeding and Seed Production (Tashkent).

TABLE 1

Fatty acids	Phosphatidylcholines (PChs)			Phosphatidylethanolamines (PEs)			Phosphatidylinositols (PIs)		
	initial	position		initial	position		initial	position	
		1	2		1	2		1	2
10:0	0,8	0,5	0,6	5,3	2 1	1,8	0,5	1,0	2,4
12:0	0,5	0,5	0,7	0,5	0,5	0,5	0,3	—	1,9
14:0	0,4	0,4	0,4	0,2	0,3	0,4	0,2	—	0,7
16:0	22,1	37,5	4,3	27,4	51,6	3,4	37,4	72,5	5,2
16:1	0,9	1,3	0,8	1,2	1,4	0 5	0,8	1,7	0,9
18:0	1,4	3,1	—	1,0	2,6	—	4.6	8,2	0,9
18:1	26,0	25,0	26,7	13,0	6,0	18,0	8,9	5,0	11,3
18:2	47,9	31,8	66,5	51.4	35,5	75,4	47,3	11.6	77,6
$\sum$ sat. acids	25,2	41,9	6,0	34,4	57,1	6,1	43,0	81,7	10,2
$\sum$ unsat. acids	74,8	58,1	94,0	65,6	42,9	93,9	57,0	18,3	89,8

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THE PHOSPHOLIPIDS OF THE COTTON PLANT OF VARIETY "TASHKENT -3"

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The present paper gives the results of a study of the phospholipids present in the seed kernels of the wilt-resistant cotton plant of variety "Tashkent-3." The total phospholipids obtained by Folch's method [1] from the acetone-defatted seed kernels contained 30-50% of carbohydrates, depending on the conditions of extraction and treatment. After precipitation with acetone, we purified the crude total fraction in $CHCl_3-CH_3OH-H_2O$ (90 : 10 : 1) by gel filtration on Molselekt G-25 [2]. The completeness of purification was checked by thin-layer chromatography. The sugars were eluted from the column with methanol, and after acid hydrolysis they were analyzed by paper chromatography.

The carbohydrates consisted of disaccharides containing galactose and glucose residues. The yield of total phospholipids after purification from carbohydrates was 1.5% of the weight of the air-dry kernels. However, in addition to phosphorus-containing components, the total phospholipids also contained substances of sterol nature and neutral lipids, which were eluted from the silica gel with acetone. The yield of pure total lipids was 1.3%. Their phosphorus content was 3.2%. On two-dimensional chromatography in the systems 1) $CHCl_3-CH_3OH-25\%\ NH_3$ (65 : 40 : 10) and 2) $CHCl_3-CH_3OH-H_2O$ (65 : 35 : 5), seven phosphorus-containing spots appeared with R_f : 0.05 lysophosphatidylcholines (LPChs); 0.1 unidentified, X_1; 0.35 phosphatidylinositols (PIs); 0.4 phosphatidylcholines (PChs); 0.6 phosphatidylethanolamines (PEs); 0.9 unidentified, X_2; and 0.9 unidentified, X_3 (the R_f values are given in system 2). Then the total phospholipids were separated into ethanol-soluble and ethanol-insoluble fractions by precipitation in ethanol (10-fold volume). The ethanol-soluble fraction amounted to 73% and the ethanol-insoluble fraction to 27%. Two-dimensional chromatograms of both fractions were different from those of the combined phospholipids both qualitatively and quantitatively: The ethanol-soluble fraction lacked the component X_1 and the ethanol-insoluble fraction lacked the LPChs. The quantitative separation of the individual components in the combined phospholipids and also in the ethanol-soluble and ethanol-insoluble fractions, was determined by their P contents [4] (Table 1).

Thus, the main phosphorus-containing substances of the total phospholipids are phosphatidylcholines, phosphatidylinositols, and phosphatidylethanolamines, and these were isolated in the pure state by column chromatography of the ethanol-soluble and ethanol-insoluble fractions of the total material on silica gel with subsequent rechromatography in a thin layer.

TABLE 1. Composition of the Total Phospholipids, %

Composition	X_1	LPChs	PIs	PChs	PEs	X_2	X_3
Total phospholipids	2.0	5,7	17,1	55,1	12,4	5,7	2,0
Ethanol-soluble fraction	—	4,6	4,6	51,8	29,7	6,9	2,4
Ethanol-insoluble fraction	3,0	—	39,3	14,4	19,6	15,9	7,8

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