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GLYCOLIPIDS FROM *Capsicum annuum*

D. T. Asilbekova

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The component and fatty-acid compositions of glycolipids from seeds and pulp of Capsicum annuum *(Solanaceae) were established. The dominant acid of seed galactolipids was found to be linoleic; of pulp, linolenic. The content of medium-chain acids 9:0-15:0 was greater in seed glycolipids than in the analgous component of pulp lipids.*

Key words: Solanaceae, *Capsicum annuum*, glycolipids, fatty acids.

In continuation of research on lipids of *Capsicum annuum* (Solanaceae) fruit, we studied the glycolipid (GL) composition of seeds and pulp and the fatty-acids, of their acyl-containing components. GL fractions were prepared by column chromatography and separated by preparative TLC from lipids of seeds [1] and pulp [2] of the sweet variety (Gift of Tashkent) of red pepper. The homogeneity of the isolated GL fractions was monitored by TLC. The content of pure GL in them was found using the reaction of galactose with anthrone because of the presence of carotynoid pigments [3]. Table 1 gives the GL composition of *C. annuum* seeds and pulp.

It can be seen that GL of seeds consist of five components with sterylglycosides predominating. Digalactosyldiacylglycerides have the lowest mass (0.07 mg/g). The pulp GL also contain five components. Of these, the main ones are monogalactosyldiacylglycerides, digalactosyldiacylglycerides, and sterylglycoside esters. The ratio of acyl-containing GL is 2:1:1, respectively. The pulp GL contain three times less sterylglycosides than the seeds.

We previously reported that *C. annuum* pulp lipids contain sulfoquinovosyldiacylglycerides. These are known to be characteristic of chloroplasts of photosynthetic plant tissue [4]. This sulfolipid makes up only 3% of the pulp GL mass.

The fatty-acid composition was found by isolating acids from the principal acyl-containing GL components from seeds and pulp. These were converted to the methyl esters and analyzed by GC.

Table 2 gives the GC results for fatty acid methyl esters. The principal unsaturated acid of seed GL is 18:2. Pulp GL are enriched in unsaturated acids 18:3 and 18:2. Mono- and digalactosyldiacylglycerides are dominated by 18:3 (60.7 and 49.1%); sterylglycoside esters, 18:2 (>38%). The difference in the 18:1 content of seed and pulp GL acids is greatest for monogalactosyldiacylglycerides.

The saturated acids of GL components are dominated by 16:0. Its content is highest in seed sterylglycoside esters. The saturated acids of GL also contain 12:0, 14:0-18:0, and 20:0. In pure seed GL compared with the analogous pulp components, the level of saturated acids is elevated. This includes medium-chain homologs of chain length from 9 to 15 C atoms. We note that 12:0 and 14:0 acids occur in significant quantities in neutral and phospholipids of pulp [2].

Thus, the principal components of *C. annuum* seed GL are sterylglycosides and their esters with 16:0 acid whereas pulp GL are enriched in dilinolenoyl- and palmitoyllinolenoyl monogalactosyldiacylglycerides and digalactosyldiacylglycerides.

S. Yu. Yunusov Institute of the Chemistry of Plant Substances, Tashkent, fax (99871) 120 64 75. Translated from Khimiya Prirodnykh Soedinenii, No. 2, pp. 101-102, March-April, 2004. Original article submitted February 25, 2004.

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TABLE 1. GL Composition of *C. annuum* Seeds and Pulp (%)

Component	Content			
	mg/g dry wt.		% of GL mass	
	Seeds	Pulp	Seeds	Pulp
Sterylglycoside esters	0.32	0.55	17.8	22.5
Monogalactosyldiacylglycerides	0.13	1.00	7.2	40.8
Sterylglycosides	1.10	0.34	61.1	13.7
Unidentified	0.18	Tr.	10.0	Tr.
Digalactosyldiacylglycerides	0.07	0.49	3.9	20.0
Sulfoquinovosyldiacylglycerides	-	0.07	-	3.0
Total glycolipids	1.80	2.45	100	100

TABLE 2. Fatty-Acid Composition of GL from *C. annuum* Seeds and Pulp, GC, mass %

Acid	Monogalactosyldiacylglycerides		Digalactosyldiacylglycerides		Sterylglycoside esters	
	Seeds	Pulp	Seeds	Pulp	Seeds	Pulp
9:0	0.2	-	Tr.	-	Tr.	-
10:0	0.3	-	Tr.	-	Tr.	-
12:0	0.3	0.6	0.9	0.7	1.8	0.6
13:0	0.3	-	0.5	-	1.8	-
14:0	7.1	0.7	5.6	1.2	6.1	2.3
15:0	0.7	Tr.	1.8	Tr.	2.3	Tr.
16:0	27.2	19.2	36.2	22.2	43.0	29.4
16:1	1.1	0.5	1.4	0.5	Tr.	Tr.
17:0	0.7	-	1.8	Tr.	1.3	Tr.
17:1	0.7	-	1.7	-	Tr.	-
18:0	6.8	0.5	11.9	0.5	11.1	1.3
18:1	17.2	4.6	7.6	4.3	7.2	6.6
18:2	36.8	13.2	27.1	21.5	24.2	38.4
18:3	Tr.	60.7	-	49.1	-	21.4
20:0	0.6	0.7	2.5	-	1.2	-
$\Sigma_{sat.}$	44.2	21.0	61.2	24.6	68.6	33.6
$\Sigma_{unsat.}$	55.8	79.0	38.8	75.4	31.4	66.4

EXPERIMENTAL

Column chromatography of *C. annuum* seeds and pulp was performed over purified silica gel (L100/160, Czech Rep.). GL fractions were eluted using acetone and separated by preparative TLC on glass plates (20 × 20 cm) with silica gel (grade L5/40) containing $CaSO_4$ (15%) using the solvent system $CHCl_3$:$(CH_3)_2CO$:CH_3OH:CH_3CO_2H:H_2O (65:20:10:10:3 by vol.). Spots of compounds on the preparative TLC plates were developed using I_2. GL components were identified using α-naphthol and H_2SO_4 (50%) and heat. Compounds were eluted from sorbent using $CHCl_3$:CH_3OH (2:1 by vol.). The content of pure GL was determined based on galactose using anthrone reagent as before [3]. The anthrone was prepared by recrystallization from benzene. Standard galactose solutions were prepared in parallel in order to construct a calibration curve. The extinctions of GL and standard solutions were measured on a KFK-2 photoelectrocolorimeter with a blue filter at λ 440 nm.

GC of fatty-acid methyl esters was performed on a Chrom-4 chromatograph using a column coated with Reoplex 400 (15%) and a Varian Star 3400 CX with a capillary column packed with DB-1. The separation conditions have been published [1].

Fatty-acids of sterylglycoside and mono- and digalactosyldiacylglyceride esters were prepared after mild alkaline hydrolysis and methylated with diazomethane [4].

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