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LIPIDS OF *Rosa canina* PERICARP

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The most common plants of the family Rosaceae occur in the genus *Rosa* L. Many species of this genus are medicinal with a high content of biologically active compounds (carotinoids, vitamins C and E). The carotinoid content in fruit of about 50 species varies in the range 45.0–50.0 mg%; β-carotene, 5–42 mg% per absolute dry mass [1–5].

Fruit of *R. canina* L. have the highest carotinoid content (2613–3933 mg% of pericarp lipid mass) of all studied species according to our data and that in the literature [5–7].

Oils of fruit from several *Rosa* species are used for burns and dermatitis [8]. They exhibit antibacterial activity (against *S. aureus*, hemolytic streptococci, and certain anaerobic bacteria [9]) and are used in cosmetology as a substitute for bee's wax [10].

In continuation of research on lipids and lipophilic components of this plant, we studied in more detail the composition of pericarp neutral lipids (NL) and the fatty-acid composition of acyl-containing classes.

Pericarp of air-dried fruit were separated from seeds. The yield was 56.0% of the fruit mass, moisture 14.4%. Total lipids were extracted from the previously ground raw material by $CHCl_3$ with MeOH (2:1). The yield was 5.5% of the fruit mass. The extract was washed to remove non-lipid components (0.05%) using aqueous $CaCl_2$. The total lipid mass in pericarp was 1.2%; carotinoid content, 2700.8 mg%. Then total lipids were separated by column chromatography (CC) over silica gel into NL, glycolipids (GL), and phospholipids (PL) using successive elution by $CHCl_3$, $(CH_3)_2CO$, and MeOH.

NL yield, 44.2%; GL with triterpene acids (TA), 30.9%; PL, 24.9% of the total lipid mass.

The TA content in the GL fraction with TA was determined by treatment with diazomethane. Then TA as the methyl esters were separated from GL by preparative TLC on silica gel with elution by hexane:ether (1:1). The TA content was 17.4%; GL, 13.5% of the total lipid mass.

NL were identified after separation into separate classes by CC over silica gel with elution by hexane then hexane:ether with increasing content of the latter up to 100%.

The NL composition was found by TLC with elution by hexane:ether (4:1 and 1:1) and comparison with models, qualitative reactions using 50% aqueous H_2SO_4, and chemical transformations. The contents of NL classes, which were determined gravimetrically, were:

Lipid	*Content, mass%*	*Lipid*	*Content, mass%*
Hydrocarbons (including carotinoids)	9.2	Free fatty acids (FFA)	3.5
Esters of aliphatic and cyclic alcohols with fatty acids (E)	14.4	Aliphatic and isoprene alcohols	12.8
Acetates of cyclic alcohols	6.8	Triterpenols	9.9
Triacylglycerides (TAG)	11.6	Sterols	6.0
Triacylglycerides + tocopherols	3.6	Unidentified components	22.2

The above data show that triterpenols, sterols, and their esters were significantly enriched in NL and together with TA made up over 30% of the total lipids of pericarp. It is known that these compounds are physiologically active and responsible for the biological activity of many plant extracts [11, 12].

According to TLC and comparison with a model sample and to a qualitative reaction [13], one of the NL fractions contained tocopherols, which are also biologically active components.

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TABLE 1. Lipid Fatty Acids of *R. canina* Pericarp, GC, mass %

Acid	E	TAG	FFA	NL	GL	PL
10:0	Tr.	2.6	0.5	0.2	0.9	0.9
12:0	3.3	1.6	1.0	5.4	3.0	1.0
14:0	3.1	3.7	1.5	4.2	2.2	0.9
15:0	0.7	Tr .	0.5	0.9	Tr .	Tr .
16:0	27.0	24.5	50.1	25.6	15.6	22.3
16:1	2.4	1.6	1.5	0.8	0.4	1.1
17:0	1.1	Tr .	Tr .	0.5	0.3	0.8
18:0	7.5	5.8	5.2	8.8	3.8	4.9
18:1	10.1	15.9	10.4	9.2	4.4	6.7
18:2*	16.1	25.0	12.4	14.3	7.5	16.5
18:3*	20.6	14.3	6.6	16.8	50.5	44.9
20:0	2.3	1.1	1.5	3.3	1.7	Tr .
22:0	5.3	3.2	3.8	3.6	2.0	Tr .
$\sum_{unident.}$	0.5	0.7	5.0	6.4	7.7	–
$\sum_{sat.}$	50.3	42.5	64.1	52.5	29.5	30.8
$\sum_{unsat.}$	49.2	56.8	30.9	41.1	62.8	69.2
$\sum_{essent.}$*	36.7	39.3	19.0	31.1	58.0	61.4

Tr.: traces.

Analysis of GL by TLC on silica gel with elution by $CHCl_3$:$(CH_3)_2CO$:MeOH:AcOH:H_2O (65:20:10:10:3) and detection by α-naphthol and $HClO_4$ showed that their principal classes were sterolglycosides and their esters, monogalactosyl- and digalactosyldiglycerides, cerebrosides, and polar unidentified GL.

PL were identified using 2D TLC on silica gel with elution in the first direction by $CHCl_3$:MeOH:NH_4OH (13:7:1); in the second direction, $CHCl_3$:MeOH:AcOH:$(CH_3)_2CO$:H_2O (10:5:2:4:1). Detection used Dragendorff's and Vaskovsky reagents [14]. Thus, it was found that the principal PL of *R. canina* pericarp were phosphatidylinosites, phosphatidylcholines, phosphatidylethanolamines, phosphatidic acids, and lyso-phosphatidylinosites.

The fatty-acid composition of acyl-containing lipids was determined after alkaline hydrolysis of the corresponding classes and subsequent methylation of the resulting fatty acids [15]. Analysis of fatty-acid methyl esters was carried out using GLC on a Chrom-5 instrument with a flame-ionization detector over a column packed with Chromaton N-AW with 15% Reoplex-400 at 192°C. Table 1 gives the results.

NL of pericarp were enriched in saturated acids, the fraction of which was 52.5%. They were only 9.2% of NL from whole fruit, which was studied earlier [6]. The main saturated acid in NL and in the separate fractions was 16:0. A high content of essential fatty acids was observed in PL (61.4%) and GL (58.0%), which was almost two times greater than in NL. Among these acids in GL and PL, 18:3, which made up 50.5 and 44.9% of the fatty-acid mass, dominated.

Thus, NL from *R. canina* pericarp and the fatty-acid composition of separate lipid classes were studied for the first time. A high content of biologically active components including carotinoids and aliphatic and cyclic alcohols and their esters was found in the NL. It has been shown that NL of pericarp contain acids that are highly saturated. Unsaturated acids dominated in PL.

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