AN INVESTIGATION OF MAIZE GERM CAKE

A. Sh. Isamukhamedov, M. Talipova, and A. I. Glushenkova

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It is known that in the processing of maize grain it is necessary to remove the germ, which makes up 12% of the weight of the grain. The germ is rich in physiologically active substances and contains more than 50% of fat [1].

The aim of our work was to study the lipids of germ cake (GC) obtained after the elimination of fat from it. The oil content of the GC on the absolutely dry weight was 12.6%. The lipids were extracted with chloroform–methanol (2:1). The extract consisted of neutral lipids (NLs) (84.9%), glycolipids (GLs) (8.5%), and phospholipids (PLs) (6.6%). They were separated and identified with the aid of column chromatography, preparative and analytical TLC, and specific qualitative reactions, and also by comparison with authentic samples [2, 3].

The NL fraction consisted of triacylglycerols, with minor amounts of hydrocarbons, free fatty acids, di- and monoacylglycerols, and sterols and their esters.

The GL fraction contained sterol glycosides and trace amounts of esters of sterol glycosides, mono- and digalactosyldiglycerols, and cerebrosides.

The PL fraction consisted of phosphatidylcholines (PCs), phosphatidylethanolamines (PEs), and phosphatidylinositols (PIs), with trace amounts of phosphatidic acids (PAs), lysophosphatidylinositols (L-PIs), lyso-phosphatidylethanolamines (L-PEs), lyso-phosphatidylcholines (L-PCs), phosphatidylglycerols (PGs), diphosphatidylglycerols (DPGs), N-acylphosphatidylethanolamines (N-PEs), and lyso-N-acylphosphatidylethanolamines (L-N-PEs).

The qualitative composition of the PLs of the cake that we obtained differed from that reported in the literature by the large set of lyso-PLs [4-6].

The fatty acid compositions of the NLs, GLs, and PLs and the positional compositions of the main PLs were determined (Table 1). It can be seen from Table 1 that the sn-1 position was occupied predominantly by the 16:0 acid, while unsaturated acids were localized in the

TABLE 1. Fatty Acid Compositions of the NLs, GLs, and PLs Isolated from Maize Cake

FAs of the lipids	12:0	14:0	16:0	16:1	18:0	18:1	18:2	18:3	ΣS	EU
NLs	0,9	0,4	11,2	0,8	1,5	35,7	48,9	0,5	14,1	85.9
GLs	1,3	2,2	27,6	—	3,6	31,1	34,2	—	34,7	65,3
PCs										
Total	0,1	0,1	18,8	—	0,7	33,3	46,4	0,6	19,7	80,3
Sn-1	0,2	0,2	35.6	—	1,4	34,5	27,2	0 9	37,4	62 6
Sn-2	—	—	2,0	—	—	32,1	65,6	0,3	2,0	98,0
PIs										
Total	—	0,3	36,2	3,0	0.6	17,2	41,8	0.9	37,1	62,9
Sn-1	—	0,4	68,7	1.6	1,2	10,0	17,8	0,3	70,3	29,7
Sn-2	—	0,2	3,7	4,4	—	24,4	65,8	1,5	3,9	96,1
PEs										
Total	—	0,2	22,5	—	1,4	18,8	56,4	0,7	24,1	75,9
Sn-1	—	0,2	39,5	—	2,8	14,4	42,3	0,8	42,5	57.5
Sn-2	—	0,2	5,5	—	—	23,2	70,5	0.6	5,7	94,3
PAs	—	1,7	24,1	—	4,6	25,8	42,9	0,9	30,4	69.6
L-PIs	—	8,4	26,3	—	1,2	22,3	48,6	1,2	27,9	72,1
L-PEs	0,4	0,4	22,1	—	1 0	22,2	53,9	—	23,9	76,1
L-PCs	—	0,2	17,6	—	1,2	32,7	47,8	0,5	19,0	81.0
PGs	—	0,1	24,2	—	0,6	25,9	48,3	0,9	24,9	75,1
DPGs	—	0,2	18,3	—	0,8	27.1	53,4	0,2	19,3	80,7
L-N-PEs	1.0	0,4	22,8	—	1,0	20.3	53,3	1,2	25,2	74,8
N-PEs	0,2	0.2	20,2	—	0,8	24,5	53,1	1,0	21,4	78,6

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sn-2 position, which corresponds to the known situation concerning the distribution of acyl radicals in PLs. The qualitative composition of the fatty acids of the minor PLs was practically the same.

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POLAROGRAPHIC DETERMINATION OF COUMARIN AND CINNAMIC ACID IN THE PREPARATION FIBS

Yu. E. Orlov, L. Ya. Sirenko, and O. P. Lichino

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Continuing investigations of the chemical compositions of drugs containing coumarins and their derivatives [1], we have developed procedures for determining coumarin and cinnamic acid, which are used as stabilizers in an injection solution of FIBS [2].

In an investigation of the electrochemical reduction of coumarins and cinnamic acids at a dropping mercury electrode [3-7], changes in the nature of the currents and the kinetics of reduction as functions of the compositions of the solvent and of the electrolyte and of the pH of the medium were found. The kinetic current of coumarin and cinnamic acid (pH 4-7) passes into a diffusion current at pH 7.4 (Britton–Robinson buffer) with $E_{1/2}$ = 1.67 V. Under these conditions, cinnamic acid does not give a wave. On a LiCl background in aqueous media, the first wave for cinnamic acid is observed at $E_{1/2}$ = −1.45 V. We have used these properties for the determination of coumarin and cinnamic acid in the preparation FIBS. The quantitative determination was made by the method of additives [7].

Determination of Coumarin. To 5 ml of the preparation was added 5 ml of buffer solution with pH 8-9, and the mixture was carefully stirred and was placed in the cell. Hydrogen

TABLE 1

Number	Series	Taken, g/ml		Determined, g/ml		Metrological evaluation
		coumarin	cinnamic acid	coumarin	cinnamic acid	
1	1070571			0,000100	0,000290	$\overline{X}=1,0\cdot10^{-4}$
2	1070572			0,000110	0,000292	$S=5,59\cdot10^{-6}$
3	2071071			0,000100	0,000228	$S_{\overline{X}}=1,97\cdot10^{-6}$
4	2101071			0,000 90	0,000276	$\pm E_{rel}=5,59\%$
5	1	0,000100	0,000300	0,000100	0,000290	$\Pi\overline{X}=2,83\cdot10^{-4}$
6				0,000098S	0,000300	$S=2,40\cdot10^{-5}$
7				0,000104	0,000305	$S_{\overline{X}}=8,49\cdot10^{-6}$
8				0,000099	0,000280	$\pm E_{rel}=8,48\%$

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