AN INVESTIGATION OF THE OIL OF THE SEEDS OF THE COTTON PLANT OF VARIETY 108-F AS A FUNCTION OF THEIR RIPENING

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To characterize the seeds, we determined their moisture content, oil content, and content of bound and firmly bound lipids [1], the latter amounting to 1.1% and 0.05%, respectively. The amount of total gossypol was found by the p-anisidine method [2].

We determined the acid number of the oil and its fatty acid composition by GLC. The oil was extracted from the seeds with chloroform–methanol (2:1) by four steepings at room temperature with the subsequent washing of the extracts with a 0.29% solution of NaCl to eliminate water-soluble components. Its indices are given in Tables 1 and 2, in which the oil content and the total gossypol are given as percentages of the absolutely dry weight.

It can be seen from Table 1 that the oil content and total gossypol content increase as the seeds ripen. Gossypol appears at the 20th day of development of the bolls, which is in agreement with literature information [2]. The acid number of the oil falls from 27.9 mg of KOH for the 10-day seeds to 7.1 for the ripe seeds.

TABLE 1

Index	Days of ripening						
	10	20	30	40	50	60	65
Moisture content of the seeds, %	87,1	78,8	79,3	66,7	—	43,7	6,97
Oil content, %	3.41	10,9	14,7	22,6	23,8	22,7	21,8
Total gossypol, %	None	Traces	0,33	0,58	0,64	—	0,76
Acid No., mg KOH	27,9	—	12,5	14.5	13,9	12,3	7,1

TABLE 2

Acid	Days of ripening						
	10	20	30	40	50	60	65
C_8—C_{12}	Traces						
$C_{14:0}$	0,2	0,4	0,4	0,4	0,5	0,5	0,5
$C_{16:0}$	25,1	24,3	25,2	24,3	24,5	24,2	24,4
$C_{16:1}$	0,6	0,6	0,6	0,6	0,6	0,6	0,6
$C_{17:0}$	Traces						
$C_{18:0}$	0,3	1,5	1,1	1,1	1,3	1,3	1,2
$C_{18:1}$	9,4	16,5	15,8	17,5	18,2	17,8	16,7
$C_{18:2}$	18,0	50,7	54,5	55,0	52,8	52,5	55,4
C_x	Traces		1,6	0,8	1,9	1,8	1,2
$C_{18:3}$	43,1	4,9	1,0	0,3	1,0	1,3	Traces
$C_{20:0}$	2,1	1,1	—	—	—	—	—
$C_{20:1}$	1,3	—	—	—	—	—	—
Σ_{sat}	27,7	27,3	26,7	25,8	26,3	26,0	26,1
Σ_{unsat}	72,3	72,3	73,3	74,2	73,7	74,0	73,9

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As can be seen from Table 2, the oil of the 10- and 20-day seeds contains a considerable amount of linolenic acid (43.1 and 4.9%), although there is almost none in the ripe seeds. The total saturated acids of the oil scarcely change as the seeds ripen, varying between 25.8 and 27.7%.

On the oil of the ripe seeds, we determined the amount of volatile and water-soluble acids (Reichert-Meissl No.) and also the volatile water-insoluble acids (Polenske No.), which proved to be 0.4 and 0.6%, respectively. To determine the composition of the volatile low-molecular-weight fatty acids qualitatively, we extracted them repeatedly with diethyl ether and deposited the ethereal solution on a plate with an impregnated layer of cellulose and carried out chromatography in the hexane–diethyl ether–dimethylformamide (40:20:1) system [3]. By comparison with markers, we found that they included low-molecular-weight monocarboxylic acids from C_2 to C_{11}.

In addition, we found diol lipids in the seeds of different degrees of ripeness.

The amount of cyclopropenoid acids in the oils decreased as the seeds ripened.

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