Chemistry of Natural Compounds, Vol. 36, No. 1, 2000

LIPIDS OF TYPE 6524-C COTTON SEEDS

A. B. Dzhamalov, M. A. Radzhabov, and A. M. Sotvoldiev

UDC 547.915.665.33

Oil from type 6524-C cotton seeds grown in isolation and selectively is studied. The compositions of lipids, fatty acids, and triacylglycerides are determined.

Key words: cotton, lipids, fatty acids, triacylglycerides.

Buyers of cotton have traditionally been concerned with the acquisition of high-quality fiber. However, much attention is today paid to the production of seeds with a high oil content. Furthermore, the technology of growing cotton has changed, in particular, covered shelters have begun to be used. Lipids from seeds obtained from cotton grown this way have not been studied.

We studied lipids from seeds of the select type 6524-C new species that were grown in Namangansk (sample III) and Urgenchsk (sample IV) regions and supplied to us by the Zaitsev Institute of Selection and Seed Production and that were grown under shelters (sample II). The control (sample I) consisted of seeds of the same type that were grown under ordinary conditions.

The characteristics of samples I-IV of type 6524-C cotton seeds are listed below:

Characteristic, %	I	II	III	IV
Oil content	21.33	20.76	19.33	23.75
Moisture	5.25	5.14	5.47	5.83
Oil content abs. d. s.	22.28	21.88	20.45	25.25
Free gossypol	1.3	1.1	0.5	0.1
Acid number of seed oil	5.9	6.39	7.29	4.44
Seed content:				
kernel	55.8	53.9	-	-
husk	44.2	46.1	-	-

The content of kernel, oil, and free gossypol in the control seeds was higher than in those grown under shelters. The acid number was almost 0.5 mg KOH lower. Sample III had a lower and IV a greater oil content than the control. The control had the lowest gossypol content. Furthermore, an undersized kernel was noted in sample II during the determination of the kernel and husk content.

The content of lipid classes was determined, %:

Lipid class	I	II	III	IV
Hydrocarbons + wax	4.5	4.7	3.9	8.6
Triacylglycerides	79.0	88.2	78.4	80.6
Free fatty acids + epoxyacylglycerides	2.7	2.4	3.6	3.4
Diacylglycerides + sterols	10.3	2.9	8.3	5.1
Unidentified comp.	3.5	1.8	5.8	2.3
Phospholipids	1.19	1.51	1.42	0.94

Association "Maslozhirtabakprom," Tashkent, fax (998-712)-56-60-93, -55-39-16. Translated from Khimiya Prirodnykh Soedinenii, No. 1, pp. 35-36, January-February, 2000. Original article submitted December 6, 1999.

 0009-3130/00/3601-0044$25.00

TABLE 1. Fatty-Acid Composition, GLC %*

Sample	14:0	16:0	18:1	18:2	satd.	unsatd.
Neutral lipids						
I	4.6	31.3	17.8	46.0	36.2	63.8
II	2.2	23.0	20.3	54.5	25.2	74.8
III	3.2	24.0	20.6	52.2	27.2	72.8
IV	1.6	20.8	22.5	55.3	22.4	77.6
Bound lipids						
I	5.7	39.1	18.7	36.5	44.8	55.2
II	3.5	26.1	26.1	44.3	29.6	70.4
III	2.5	31.0	17.5	49.0	33.5	66.5
IV	3.8	31.0	20.9	44.3	34.8	65.2
Strongly bound lipids						
I	-	41.7	21.1	37.2	41.7	58.3
II	-	43.0	10.3	46.7	43.0	57.0
III	-	52.5	14.5	33.0	52.5	47.5
IV	-	40.3	15.6	44.1	40.3	59.7

*Stearic and palmitoleic acids are observed in trace quantities.

The content of lipids from the main class, triacylglycerides, in oil from seeds grown under shelters is higher than in the control and select samples; of incompletely acylated glycerol, i.e., diacylglycerides and free fatty acids, less. These data indicate that triacylglyceride synthesis in sample II is more extensive than in the other samples.

Phospholipids consist of phosphatidylcholines, phosphatidylinosites, phosphatidylethanolamines, phophatide acids, lysophosphatidylcholines, and N-acylphosphatidylethanolamines. Glycolipids are qualitatively observed in polar lipids.

Table 1 lists the fatty-acid composition of neutral, bound, and strongly bound lipids in the studied seeds. The array of fatty acids is qualitatively identical for the samples. Therefore, the composition of triacylglycerides of neutral lipids was determined only for sample II by lipolytic hydrolysis (% GLC):

	14:0	16:0	16:1	18:0	18:1	18:2	$\Sigma_{satd.}$	$\Sigma_{unsatd.}$
Triacylglycerides	Tr	15.3	Tr	1.2	20.7	62.8	16.5	83.5
Monoacylglycerides	-	3.8	0.2	0.5	22.2	73.3	4.3	95.7

The Sn-2-position of the triacylglycerides is 95.7% acylated by unsaturated fatty acids, which is completely expected.

The above data were used to calculate the types of triacylglycerides: disaturated-monounsaturated, 15.0%; monosaturated-diunsaturated, 46.5%; triunsaturated, 38.0%; trisaturated, 0.5%. This occurs because the content of the saturated acids in the triacylglycerides was only 16.5%, which is insufficient for a more complete esterification of the three hydroxyls of glycerine. The data obtained are consistent with those in the literature [1].

EXPERIMENTAL

The characteristics of the seeds were determined as before [2]. Phospholipids were identified using TLC on silica gel and two-dimensional chromatography: first direction, $CHCl_3$-CH_3OH-NH_3 (8:3:1); second direction, $CHCl_3$-CH_3OH-H_2O-CH_3CO_2H (8:3:1:1). The chromatograms were developed with ninhydrin, Dragendorff's solution, Vas'kovskii reagent, and 50% aqueous H_2SO_4.

The composition of lipid classes was determined by ITLC on silica gel using petroleum ether-diethylether (8:2). The

separate classes of lipids were detected visually, collected, and eluted from the silica gel by $CHCl_3$-CH_3OH (2:1). After removing solvents the contents of the components were estimated gravimetrically.

Lipolytic hydrolysis was performed according to the literature [3]. GLC of the fatty-acid methyl esters was performed as before [4].

REFERENCES

1. T. V. Chernenko, A. L. Markman, and A. U. Umarov, *Khim. Prir. Soedin.*, 76 (1969).
2. *Technochemical Control and Production Accounting in the Oil Industry* [in Russian], Pishchepromizdat, Moscow (1989), p. 19, 53, 55, 57.
3. A. L. Markman, T. V. Chernenko, and A. U. Umarov, *Prikl. Biokhim. Mikrobiol.*, 616 (1969).
4. N. T. Ul'chenko, S. D. Gusakova, and A. I. Glushenkova, *Khim. Prir. Soedin.*, 515 (1993).