

TRIACYLGLYCEROLS OF FRACTIONATED COTTONSEED OIL

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The fatty-acid and triacylglycerol compositions of forepressing cottonseed oil and the refined and standard oils, and also of the palmitin fraction have been studied. It has been shown that the scheme of fractionation adopted does not give a clear separation of cottonseed oil into salad oil and palmitin. It has been found that typical compositions of the diunsaturated-monosaturated TAGs of the forepressing and refined and salad oils are practically the same, while the amount of diunsaturated-monosaturated TAGs in the palmitin fraction is far higher than in the others.

Cottonseed contains 26% of palmitic acid. To improve its quality, cottonseed oil is separated into salad oil and palmitin fractions. The latter is used, after hydrogenation, in the manufacture of margarine.

There is a large number of publications on the technology of fractionation of the oil, but the compositions of the triacylglycerols of the fractions obtained have so far been studied inadequately [1-4].

TABLE 1. Compositions of the Triacylglycerols (TAGs) of the Initial, the Refined, and the Fractionated Cottonseed Oils

Type of TAG	Species of TAG	Sample			
		1	2	3	4
GIS <sub>3</sub>	PPP	0.51	1.06	0.44	2.12
GIS <sub>2</sub> U	PPO*	0.52	1.04	0.46	1.56
	PPL	1.83	3.72	1.76	5.28
	PLP†	7.28	6.40	5.99	9.84
	POP	1.78	2.02	1.70	2.58
ΣGIS <sub>2</sub> U		11.41	13.18	9.91	19.26
GISU <sub>2</sub>	OPO	0.12	0.25	0.12	0.28
	OPL	0.88	1.82	0.88	1.96
	LPL	1.58	3.29	1.76	3.33
	POO	1.76	1.96	1.74	1.90
	POL	6.18	7.10	6.84	6.46
	PLO	7.16	6.24	6.10	7.22
	PLL	25.30	22.54	23.94	24.72
	ΣGISU <sub>2</sub>		42.98	43.20	41.38
GIU <sub>3</sub>	OOO	0.43	0.48	0.44	0.35
	OOL	3.06	3.46	3.48	2.38
	LOL	5.37	6.26	6.79	4.07
	OLO	1.76	1.52	1.55	1.33
	OLL	12.48	10.98	12.16	9.10
	LLL	22.00	19.86	23.85	15.52
ΣGIU <sub>3</sub>		45.10	42.56	48.27	32.75

\*O = sum of the C<sub>16:1</sub> + C<sub>18:1</sub> monoenoic acids.

†S - sum of C<sub>14:0</sub> + C<sub>16:0</sub> + C<sub>18:0</sub>; L - C<sub>18:2</sub>.

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We have investigated forepressing cottonseed oil (1) and the refined oil (2), salad oil (3), and palmitin fraction (4), obtained from it, the physical indices of which are given below:

	1*	2	3	4
Color, red units in a 13.5-cm layer	29,5	8,0	7,4	—
Acid no., 0	1,80	0,10	0,10	0,20
Moisture and <sup>100</sup> volatile matter, %	0,20	0,10	—	0,19
Phosphatides, %	1,40	0,20	—	—
Gossypol (free), %	0,20	0,01	—	—
Unsaponifiable, %	2,20	1,80	1,70	—
Iodine no., % I <sub>2</sub>	110,60	110,70	112,64	100,2

The color of the oil, its acidity, and its phosphatide and gossypol contents fall on refining, which is completely normal, and the iodine number of the salad oil increases slightly.

In fractionation, one should expect a considerable passage of the oleic and the linoleic acid in the salad oil fraction. However, our experiments show that the amounts of oleic acid in the triacylglycerols (TAGs) of the samples studied were practically the same, apart from the palmitin fraction, while there was actually more linoleic acid in the salad oil (see below) and in the refined oil there was less than in the initial oil.

The fatty-acid compositions of the triacyl- and monoacylglycerols were as follows:

Oil	C <sub>14:0</sub>	C <sub>16:0</sub>	C <sub>16:1</sub>	C <sub>18:0</sub>	C <sub>18:1</sub>	C <sub>18:2</sub>
Forepressing						
TAG	0,60	20,29	0,77	1,55	15,58	61,21
MAG	0,78	3,67	0,99	0,99	17,59	75,98
Refined						
TAG	0,57	21,49	0,96	2,19	16,03	58,76
MAG	0,52	7,03	1,03	3,63	20,25	67,54
Salad						
TAG	0,55	18,41	0,69	1,87	15,99	62,49
MAG	0,23	4,58	0,45	0,61	20,59	73,54
Palmitin fraction						
TAG	0,38	28,62	0,77	1,25	14,49	54,49
MAG	0,72	12,32	0,73	1,48	17,02	67,73

As we see, the composition of the monoacylglycerols is variable; here, probably, there is an intramolecular migration of acyl radicals.

Table 1 gives the types and species of triacylglycerols. The figures in the table show that the palmitin fraction is reduced in triunsaturated and monounsaturated-disaturated TAGs, and only the trisaturated TAGs are present in the fraction in a smaller amount as compared with the other samples. The type compositions of the diunsaturated-monosaturated (GLU<sub>2</sub>S) and disaturated-monounsaturated (GLS<sub>2</sub>U) TAGs of the first three oils are approximately the same. The highest concentration of triunsaturated TAGs is found in the salad oil and the smallest amount in the palmitin fraction.

The results obtained show that the technology used for separating the oil into salad and palmitin fractions has a low efficiency, since a large amount of low-melting fraction (salad oil) is sorbed in the solid fraction (palmitin fraction), which reduces the degree of separation.

#### EXPERIMENTAL

The samples of the oils for investigations were obtained from the Fergana Oils and Fats Combine, where fractionation was carried out by cooling the prepressing oil to +12°C in brine coolers.

Crystallization was carried out in special chambers at +5-6°C for 48-50 h. The salad oil was filtered in frame filter presses [4]. The physicochemical indices of the oils were established by well-known methods [5], and the iodine numbers by Hanus's method.

To determine the compositions of the TAGs we used the method of enzymatic hydrolysis [6]. The fatty acids were methylated with diazomethane. The GLC of the methyl esters was carried out on a Khrom-4 chromatograph at 194°C and V = 100 ml/min. The column, 250 × 0.4 cm, was filled with Chromaton N-AW with 17% of ethylene succinate.

\*Color of the oil in a one-centimeter layer.

## SUMMARY

The fatty-acid and triacylglycerol compositions of cottonseed forepressing oil and samples of refined oil, salad oil, and palmitin fraction obtained from it have been studied. The type compositions of the diunsaturated-monosaturated triacylglycerols ( $GLU_2S$ ) of the forepressing, refined, and salad oils were practically identical, while the amount of diunsaturated-monounsaturated ( $GL_2SU$ ) the palmitin fraction was far higher than in the others. The salad oil was enriched with triunsaturated triacylglycerols.

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## TERPENOIDS FROM PLANTS OF THE FAMILY CUPRESSACEAE.

### I. SESQUITERPENE ALCOHOLS FROM THE NEEDLES OF *Microbiota decussata*

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The sesquiterpene alcohols 5S,8S-germacra-1E,6E-dien-5-ol, (+)- $\alpha$ -bisabolol, hedycaryol, and  $\beta$ -eudesmol and also the previously undescribed alcohols thujopsan-2 $\alpha$ -ol (I) and microbiotol. Microbiotol is a tricyclic tertiary alcohol with the empirical formula  $C_{15}H_{26}O$ , mp 112-113°C, containing in its molecule four tertiary methyl groups and cyclopropane ring.

*Microbiota* (*Microbiota decussata* Kom.) belongs to the only endemic monotypical genus of conifers of the USSR and is distributed in the Sikhote-Alin' range in Maritime Territory and in the south of the Khabarovo Territory [1]. This monoecious evergreen bush of the family Cupressaceae has its maximum distribution in the southern part of the Sikhote-Alin' range (Partizanskii and Livadiiskii ranges) and here it grows en masse, covering the rocky alluvial deposits completely or partially. Usually, *microbiota* forms a band above the forest vegetation, but not infrequently along the mountain springs through the breaks it comes down from the high-mountain region to a height of 300 m above sea level, and at the edges of the rocky deposits it is sometimes found below the forest threshold. In the northern part, the area of *microbiota* is disjunctive. Separate growth sites of the species have been reported in the upper course of the river Khor and on the watershed between the rivers Khor and Anyui in the Khabarovo Territory. In Komarov's opinion [2], the tree and the generalized genus *Microbiota* Kom. are closest to the genus *Biota*.

This plant has not previously been studied chemically. For the investigation we used fresh needles collected in the autumn. An ethereal extract obtained by steeping at room tem-

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