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ESSENTIAL AND FATTY OILS OF Agastache rugosa

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Wrinkled giant hyssop Agastache rugosa (Fisch, et Mey) Kuntze, family Lamiaceae growing in the Far East, is the sole representative of the genus Agastache Clayt ex Gronow on the territory of the Soviet Union [1]. It is a perennial herbaceous plant with a height of up to 1.7 m possessing a high crude weight that is being successfully cultivated in the collection of the Northern Caucasus zonal experimental station of VILR as a promising medicinal plant. In experiments, galenical preparations of it have shown a tranquilizing and anticonvulsive action [2]. In addition, the essential oil of wrinkled giant hyssop is used in the perfumery, soapboiling, confectionery, fishery, and preserving industries [3].

The isolation from this plant of the flavonoid compounds tilianin, acacetin, linarin, and agastachosid [4] and the quantitative and qualitative compositions of the essential oil [3, 5] have been reported previously.

We have continued an investigation of wrinkled giant hyssop and have studied the physicochemical properties of the essential and fatty oils and also the acid composition of the fatty oil. The essential oil was distilled off from the leaves with steam. The fatty oil was extracted from the previously dried and ground seeds with petroleum ether (bp 40-70°C) in a Soxhlet apparatus. The physicochemical indices of the oils and of the fatty acid fractions were determined by known methods [6, 7]. The qualitative fatty acid composition and the amounts of individual fatty acids were established by gas-liquid chromatography on a Tsvet-4 chromatograph with a flame-ionization detector. The temperature of the thermostat was 193°C and that of the evaporator 300°C. The column had a diameter of 4 mm and a length of 2 m. The solid support was Celite 545 (40-60 mesh), the liquid phase was diethyleneglycol succinate (10%), tnd the carrier gas argon (rate of flow 60 ml per minute). The chart speed was 400 mm/h, the volume of sample injected 0.02-0.1 µl, and the rate of feed of hydrogen 2 liers/h.

The fatty acids were identified by the internal-standard method and by comparing the retention times of known samples on a chromatogram. The known samples used were the fatty acids of a number of a oils (sunflower seed, mustardseed, peanut, etc.), fatty acids produced by the domestic industry (mixtures of fatty acids of the C_5—C_{17} and C_8—C_{24} fractions), and also individual acids — lauric, palmitic, stearic, oleic, linolenic, linoleic, erucic, etc. We also used the results of preceding investigations [8] and literature information [9,10]. The quantitative determination of each acid was carried out by known methods [11].

The physicochemical properties of the essential oil are given in Table 1 and those of the fatty oil in Table 3, the fatty acid composition being shown in Table 2.

Attention is directed to the large amount of linolenic acid in the fatty oil and its high iodine number. From these characteristics, the oil may be assigned to the drying type.

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TABLE 1. Physicochemical Properties of the Essential Oil of Agastache rugosa

Year of gathering the raw material	Amount of essential oil on the air-dry weight of the leaves, %	n_D^{20}	d_{20}^{20}	$[\alpha]_D^{20}$	Acid No., mg KOH	Ester No. mg KOH	Ester No. after acetylation, mg KOH	Bound alcohol	Free alcohols	Total alcohol content
								%		
1985	2.1	1,510	0,9235	+ 8,55	2,88	14,05	31,92	3,91	5,04	8,95
1986	2,4	1,512	0,9367	+9,14	1,75	7,79	13,26	2,17	1,53	3,70

TABLE 2. Fatty Acid Composition of the Fatty Oil of Agastache rugosa

Year of gathering the seeds	Acid													
	$C_{4:0}$	$C_{6:0}$	$C_{8:0}$	$C_{10:0}$	$C_{12:0}$	$C_{14:0}$	$C_{15:0}$	$C_{16:0}$	$C_{16:1}$	$C_{17:0}$	$C_{18:0}$	$C_{18:1}$	$C_{18:2}$	$C_{18:3}$	$C_{20:1}$
1985	Tr.	0,10	0,10	0,10	0,10	0,20	0,20	5,36	0,58	0,58	2,13	11,09	27,20	51,79	0,48
1986	Tr.	Tr.	Tr.	Tr.	Tr.	Tr.	Tr.	3,26	0,19	0,19	2,05	12,65	27,97	52,99	0,75

TABLE 3. Physicochemical Indices of the Fatty Oil of Agastache rugosa Seeds

Index	1985 r.		1986 r.	
	fatty oil	fatty acids	fatty oil	fatty acids
Oil content of the seeds, %	17,35		21,42	
Refractive index, n_D^{20}	1,4788	1,4795	1,4790	1,4795
Viscosity, °E	6,94		6,97	
Acid No., mg KOH	1,82		2,44	
Saponification No., mg KOH/g	196,94		196,97	
Iodine No., % iodine	194,27	202,75	196,84	205,15
Thiocyanogen No., % iodine	121,54	123,72	121,76	123,94
Reichert-Meissl No., %	2,32		2,44	
Polensk No., %	0,38		0,36	
Unsaponifiable substances, %	0,94		0,85	
Neutralization No., mg KOH		203,06		203,14
Mean molecular weight	276,27			276,16

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