THE OILS OF FOUR PLANTS

V. S. Dolya, E. N. Shkurupii, and N. S. Fursa

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We have previously studied the oils of the plants Atropa belladonna L. (belladonna), and Datura stramonium L. (jimsonweed datura), belonging to the family Solanaceae, and Euonimus europaea L, family Celastraceae, and Lepidium perfoliatum L. (clasping pepperweed), family Crucifereae.

The oil of the euonimus and the datura had lubricating properties scarcely inferior to PKS-1 lubricant which is used at the present time in the cold rolling of steel strip [1]. The euonimus oil can be used in the production of margarine, soap, etc. [2, 3].

The characteristics of the seeds of the plants studied are given in Table 1, the physicochemical indices of the oils in Table 2, and the compositions of the fatty acids according to gas–liquid chromatography in Table 3.

The pepperweed oil was studied in more detail. The following indices were obtained: thiocyanogen No, (% iodine) 98.45; unsaponifiable matter 1.46%; phosphatides 0.61%.

The fatty acids obtained by the saponification of the pepperweed oil with alcoholic alkali had a titer of 0°C, an iodine No. of 148.75, a thiocyanogen No. of 101.96, a neutralization of 191.44 mg KOH, and a mean molecular weight of 290.58.

TABLE 1. Characteristics of the Seeds

Index	Belladonna	Datura	Euonimus	Pepperweed
Size, mm	1.5-2.0 × 1.2-1.8	3.0	9.0 × 3.0	2.0 × 1.0
Shape	Kidney-shaped	Circular to kidney-shaped	Obovate	Oval
Surface	Cellular	Finely pitted	Densely covered with an orange aril	Almost smooth
Color	Brown	Black	Whitish	Red-brown
Oil content, %	39.60	22.68	42.04	18.71

TABLE 2. Physicochemical Indices of the Oils

Index	Belladonna	Datura	Euonimus	Pepperweed
Color, mg of iodine	15	15	45	40
Density, d_4^{20}	—	0,9600	0,9576	0,9223
Refractive index, n_D^{20}	1,4755	1,4748	1,4743	1,4770
Relative viscosity, OE_{20}	8,02	8,95	14,58	7,69
Acid number, mg KOH	1,13	4,40	5,90	1,01
Saponification number, mg KOH/g	182,93	189,25	273,00	179,88
Iodine number, % iodine	142,80	130,46	—	135,93
Reichert-Meissl No., %	0,60	1,40	34,43	0,71
Polenske No., %	0,75	0,30	0,70	0,75

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TABLE 3. Fatty Acid Compositions of the Oils

Acid, %*	Belladonna	Datura	Euonimus	Pepperweed
6:0	0.34	Traces	0,17	—
8:0	—	Traces	0,09	—
10:0	—	—	0,28	—
12:0	—	—	1,58	—
14:0	—	0,13	0,37	Traces
16:0	5,25	10,88	15,67	5,14
16:1	0,20	0,46	2,58	0,30
17:0	Traces	—	0,22	—
17:1	—	—	0,13	—
18:0	3,70	2,17	3,01	2,35
18:1	13,31	27,01	44,84	12,48
18:2	86,46	58,39	25,84	7,77
18:3	0,50	0,76	5,22	36,27
20:1	—	—	—	16,70
20:2	—	—	—	1,38
22:0	—	—	—	2,55
22:1	—	—	—	12,84
22:2	—	—	—	Traces
24:0	—	—	—	2,12
Unidentified	0,20	0,20	0,05	—

* Symbols of the acids: number before the colon – number of carbon atoms in the chain; number after the colon – number of double bonds in the molecule.

The fatty acid composition of the pepperweed oil is in good agreement with literature statements [4]. In the euonimus oil we found the low-molecular-weight fatty acid caproic acid (0.17%). In the belladonna and datura oils there is a large amount of linoleic acid (88.46 and 58.39%), the figure for datura corresponding accurately to literature information [5].

EXPERIMENTAL

The preparation and analysis of the oils was performed as described previously [6].

SUMMARY

We have determined the physicochemical indices and fatty acid compositions of the oils of four plants: Atropa belladonna L., Datura stramonium L., Euonimus europaea L., and Lepidium perfoliatum L.

The composition of the fatty acids of L. perfoliatum L. is as given in the literature. The oils of Atropa belladonna L. and D. stramonium L. contain the largest amounts of linoleic acid (86.46 and 58.39%, respectively).

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