which are claimed to lower the interfacial tension between water and glyceride oils to 2-5 dynes/cm when present in the amount of 0.1% (7).

It would appear that glycoside ester products of the type described are potentially useful as surface active agents in a number of food and nonfood products. As one example, these glycoside esters which are closely related to the glycolipids of wheat flour (1), may be as effective as the glycolipids of wheat flour in improving the quality of high protein breads (8).

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Gas Chromatograms of Synthetic Liquid Waxes Prepared from Seed Triglycerides of Limnanthes, Crambe and Lunaria

ABSTRACT

Compositions of synthetic liquid waxes derived from erucic-containing seed oils vary considerably. These differences, when determined by gas chromatography, allow "fingerprint" identification of the source of oil.

The synthesis and physicochemical evaluation of liquid wax esters derived from erucic-containing triglyceride oils, which were extracted from seeds of *Limnanthes douglasii*, *Crambe abyssinica* and *Lunaria annua*, were reported earlier (1,2). The gas liquid chromatographic (GLC) procedure developed recently (3) for the compositional analysis of the natural liquid wax ester from *Simmondsia californica* (Jojoba) has now been applied to these synthetic wax esters. Although these products have physical properties similar to jojoba oil, they are quite distinct in their chemical composition. Differences become apparent and identification is simplified when gas chromatograms of the oils are compared in fingerprint fashion (Fig. 1). The area per cent of each component in the oil is shown in Table I.

As expected, the composition of the synthetic liquid wax esters coincided with the calculated composition for a random combination of the fatty alcohol mixture with the mixture of fatty acids from the parent triglyceride oil. The calculated weight percentages are given in parentheses. Jojoba showed a nonrandom combination of its acids and alcohols; the preferential esterification of docosenol to eicosenoic acid implies that, at a certain stage of jojoba seed development, docosenyl eicosenoate is biosynthesized almost exclusively (3).

GLC experimental conditions were: high temperature silicone liquid-phase OV-1, 3% on Gas Chrom Q, acid-washed, silylated, 100-120 mesh; stainless steel column, 0.2 cm ID, 0.3 cm OD, 100 cm long; helium carrier gas, 100 ml/min, 100 psig; programing rate 2 C/min; injection port 350 C, on column; flame ionization detector oven 385 C.

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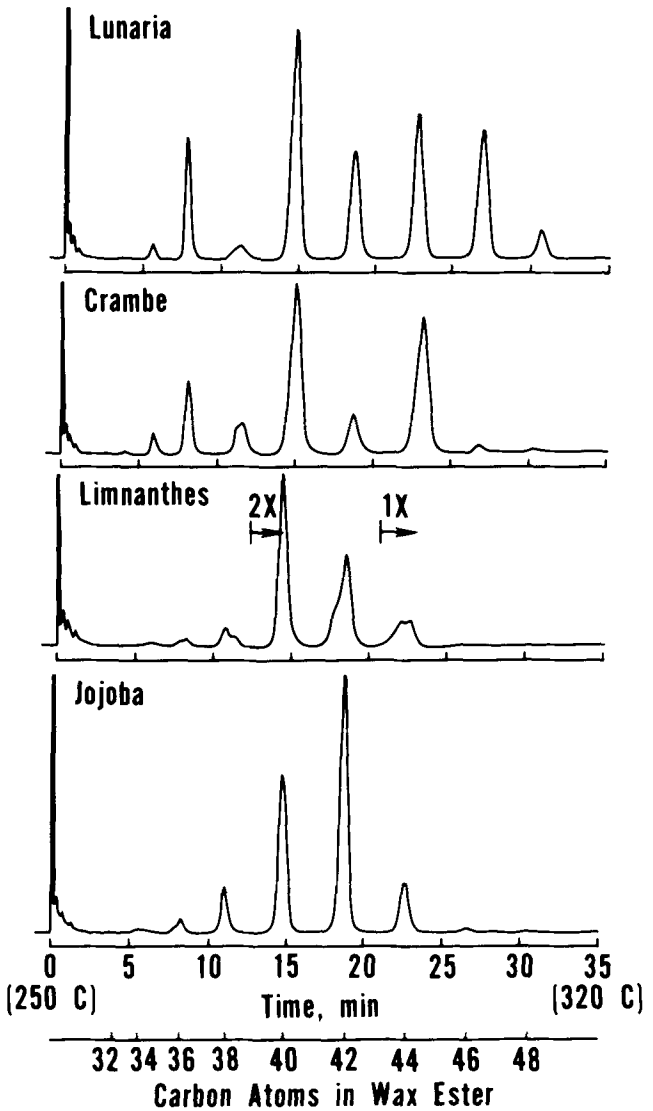

FIG. 1. Gas chromatograms of synthetic liquid waxes prepared from seed triglycerides of *Lunaria annua*, *Crambe abyssinica* and *Limnanthes douglasii* and of natural liquid wax extracted from jojoba nuts. Experimental conditions are detailed in the text.

TABLE I

Area Per Cent of Oil Components

Number of carbon atoms in wax ester	Lunaria, %	Crambe, %	Limnanthes, %	Jojoba, %
32	0.1 (0.1)	0.1 (0.1)	—	—
34	1 (1)	2 (2)	0.3 (0.2)	0.2 (0.1)
36	10 (9)	12 (13)	1 (1)	2 (1)
38	2 (2)	7 (7)	3 (3)	7 (8)
40	29 (28)	39 (39)	45 (47)	30 (39)
42	15 (15)	8 (7)	41 (40)	50 (38)
44	20 (20)	31 (31)	10 (9)	10 (12)
46	19 (20)	1 (1)	—	1 (2)
48	4 (5)	0.2 (0.01)	—	0.2 (0.1)

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