

## THE FATTY ACIDS OF INDIGENOUS RESOURCES FOR POSSIBLE INDUSTRIAL APPLICATIONS

### Part XIV. Fatty Acid Composition of the Seed Oil of *Citrus limon* Var. Eureka

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The seed oil of *Citrus limon* Var. Eureka belonging to N.O. Rutaceae was analysed for its physico-chemical properties and fatty acid composition by gas chromatography. The oil (28 %) from fresh seeds had palmitic acid (41.2 %) and oleic acid (33.5 %) as the main constituent acids. The other acids present were C12:0 (1.8 %), C14:0 (0.5 %), C16:1 (5.1%), unknown (3.1 %), C18:0 (7.2 %), C18:2 (5.1 %) and C18:3 (1.0 %).

*Key words:* *Citrus limon* Var. Eureka; Rutaceae; Lemon seed oil; Saponifiable portion.

#### INTRODUCTION

*Citrus limon* Var. Eureka [1] is a hybrid lemon and belongs to N.O. Rutaceae. It is a recently introduced species in the country. It is almost double the size of an average lemon and is gaining popularity with the citrus processing industry for its high juice content.

Extensive research work has been carried out on lemon and other citrus seed oils [2] but there is practically no published information available regarding the seed oils of *Citrus limon* Var. Eureka. In the present communication physico-chemical data and the gas chromatographic analysis of the fatty acid composition of this oil are presented.

#### MATERIALS AND METHOD

The fresh fruit purchased from the local market was cut into small pieces and the seeds were hand picked. The washed fresh seeds were crushed and extracted with hexane in a Soxhlet apparatus to obtain a pale yellow mobile oil. The yield of oil on fresh seed basis was 28 %. The oil was physico-chemically examined according to standard methods [3]. Its refractive index (1.4760), specific gravity (0.8899), acid value (0.96) and saponification value (174) were similar to those of other citrus seed oils [2] and compared well with good quality vegetable oils [4].

The oil on saponification and esterification with methyl alcohol using  $\text{BF}_3$  as a catalyst according to the method of Solomon and Hubbard [5] yielded methyl fatty esters. These esters were analysed by gas chromatography on 10 % DEGS column at  $200^\circ$  to determine the fatty acid composition of the oil. Palmitic acid (16:0; 41.2 %) and oleic acid (C18:1, 33.5 %) dominated the fatty acid profile of the oil. The other fatty acids present (Table

1) were C12:0 (1.8 %), C14:0 (0.5 %), unidentified (3.1 %) C18:0 (7.2 %), C18:2 (5.1 %) and C18:3 (1.0 %). The Eureka lemon seed oil had high proportion of unsaturated fatty acids (44.7 %).

#### RESULTS AND DISCUSSION

Citrus seed oil [2,6] are generally rich in palmitic acid (25-35 %) and linoleic acid, an essential fatty acid (35-40 %) followed by oleic acid (20-27 %). The lemon seed oils [2,7] have a higher percentage of linolenic acid (10-11 %) compared to other citrus seed oils (2-4 %). Eureka lemon seed oil on the other hand had a lower percentage of linoleic and linolenic acids. The fatty acid

Table 1. Fatty acid composition of Eureka lemon seed oil by gas chromatography and its comparison with palm oil.

Fatty acid	Eureka lemon seed oil (%)	Palm oil [8] (average %)
C12:0	1.8	0.1
C14:0	0.5	1.0
C16:0	41.2	46.1
C16:1	5.1	0.3
Unknown	3.1	—
C18:0	7.2	4.6
C18:1	33.5	38.8
C18:2	5.1	9.6
C18:3	1.0	0.2

composition thus differed from the oils derived from the seeds of other varieties of *Citrus limon*. In general, its composition was very close to that of palm oil [8] as can be seen from the Table 1.

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TABLE I  
 Characteristics of saponifiable portion of Eureka lemon seed oil

Saponifiable portion (mg)	Saponification value		Acid value		Iodine value
	mg/g	g/100g	mg/g	g/100g	
100	184	18.4	121	12.1	141
200	368	36.8	242	24.2	282
300	552	55.2	363	36.3	423
400	736	73.6	484	48.4	564
500	920	92.0	605	60.5	705

TABLE II  
 Characteristics of saponifiable portion of Eureka lemon seed oil

Saponifiable portion (mg)	Saponification value		Acid value		Iodine value
	mg/g	g/100g	mg/g	g/100g	
100	184	18.4	121	12.1	141
200	368	36.8	242	24.2	282
300	552	55.2	363	36.3	423
400	736	73.6	484	48.4	564
500	920	92.0	605	60.5	705

TABLE III  
 Characteristics of saponifiable portion of Eureka lemon seed oil

Saponifiable portion (mg)	Saponification value		Acid value		Iodine value
	mg/g	g/100g	mg/g	g/100g	
100	184	18.4	121	12.1	141
200	368	36.8	242	24.2	282
300	552	55.2	363	36.3	423
400	736	73.6	484	48.4	564
500	920	92.0	605	60.5	705

TABLE IV  
 Characteristics of saponifiable portion of Eureka lemon seed oil

Saponifiable portion (mg)	Saponification value		Acid value		Iodine value
	mg/g	g/100g	mg/g	g/100g	
100	184	18.4	121	12.1	141
200	368	36.8	242	24.2	282
300	552	55.2	363	36.3	423
400	736	73.6	484	48.4	564
500	920	92.0	605	60.5	705