

# Puerto Rican Fatty Oils

## 5. The Characteristics and Composition of Expressed Papaya (*Carica papaya* L.) Seed Oil\*

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In the last few years the canning of papaya juice has become quite a prosperous industry in Puerto Rico and for that reason large quantities of the small black seeds of the ripe fruit are easily available at the factories. These seeds, when dried at about 28°C., yield by expression an average of 10 to 15 percent of fixed oil.\*\*

The composition of papaya seed oil has been little studied in the past. With the exception of a recent investigation by von Loesecke and Nolte (1) on the characteristics and composition of the ether extracted oil from Southern Central Florida seeds, no other complete report on the subject seems to exist in the literature.

At the time we performed this investigation the oil used was eight months old. It had a brown color, a bland taste, and a faint odor somewhat resembling that of the fruit. As can be seen in Table I, its acid and peroxide values were low.

### Experimental

*Oil Characteristics.* The physical and chemical characteristics of expressed papaya seed oil are given in Table I. The Official Methods of Analysis of the

TABLE I.

Characteristics of Expressed Papaya Seed Oil from Puerto Rico

Specific gravity 25°/25°.....	0.9113
Refractive index 20°.....	1.4671
Iodine No. (Hanus).....	65.3
Saponification No.....	199.0
Acid value.....	2.69
Acetyl value.....	10.93
Reichert-Meissl No.....	1.38
Polenske No.....	0.93
Unsataponifiable matter %.....	1.17
Soluble acids %.....	1.27
Insoluble acids %.....	93.30
Saturated acids % (corr.).....	18.22
Unsaturated acids % (corr.).....	76.58
Iodine No. unsaturated acids (Hanus).....	86.81
Saponification No. unsaturated acids.....	195.7
Peroxide No. (3).....	0.9

Association of Agricultural Chemists (2) were used, unless otherwise stated.

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\*\* The oil examined was expressed at the Laboratory of Investigation and Industrial Development of the Department of Agriculture and Commerce of Puerto Rico.

*Unsaturated Acids.* The unsaturated and saturated acids were separated in the customary manner by the lead salt ether method. Two hundred grams of oil yielded 36.4 gm. of saturated and 153.2 gm. of unsaturated acids.

The unsaturated acids did not yield either hexabromostearic or tetrabromostearic acids on bromination at -10°C. This fact, together with the fact that the iodine number of the unsaturated acid fraction was 86.81, indicated that oleic acid was the only one present in the fraction. Further evidence to substantiate the above conclusion was afforded by the analysis of the brominated material, which yielded a percentage of bromine of 36.65, that is, just a trifle more than the theoretical (36.18%) for dibromostearic acid.

Therefore, the percentage of oleic acid in the oil is the same as the percentage of unsaturated acids, that is, 76.58 percent.

*Saturated Acids.* The saturated acids were esterified with methyl alcohol by the method described in Hilditch (4). The methyl esters were separated by distillation under reduced pressure into six fractions whose boiling range lay between 152° to 182°C. (4 mm.). The data of this distillation is recorded in Table II.

The identity of each of the saturated acids in the ester fractions was established by the melting point of the isolated acids and of those of their corresponding anilide derivatives, as shown in Table III.

TABLE III.

Melting Points of Saturated Acids and Derivatives

Acid	Fractions	m.p. °C. observed		m.p. °C. reported in literature
		Acid	Anilide	
Myristic.....	1, 2, 3, 4	Acid	54.0	53.8
		Anilide	84.0	83.4
Palmitic.....	1, 2, 3, 4, 5, 6	Acid	61.5	62.0
		Anilide	89.6	89.5
Stearic.....	5, 6	Acid	67.9	69.2
		Anilide	92.7	92.6

The composition of the papaya seed oil according to our findings is given in Table IV.

TABLE II.

Results of Analyses of Fractions Obtained by Distilling Methyl Esters of Saturated Acids

Fraction number	Weight of fraction. Grams	Iodine number of fraction	Saponification value of fraction	Esters of unsaturated acids. Percent	Mean molecular weight of esters of saturated acids	Myristic acid		Palmitic acid		Stearic acid	
						Percent	Gm.	Percent	Gm.	Percent	Gm.
1	4.09	3.12	228.2	3.79	244.1	84.84	3.47	5.87	0.24	.....	.....
2	4.65	4.76	213.6	5.78	260.6	30.75	1.43	58.28	2.71	.....	.....
3	4.88	5.91	208.1	7.17	267.4	9.02	0.44	78.89	3.85	.....	.....
4	5.51	7.64	206.2	9.27	269.5	2.96	0.13	83.67	4.61	.....	.....
5	4.80	11.38	199.1	13.81	279.0	.....	.....	5.65	2.71	2.54	1.22
6	2.84	15.61	196.6	18.95	282.1	.....	.....	44.37	1.26	32.39	0.92

TABLE IV.  
Unsaturated and Saturated Acids in Expressed  
Papaya Seed Oil

Acids	In unsaturated acids %	In saturated acids %	In original oil %	Glycerides in oil %
Oleic.....	100	.....	76.58	80.03
Myristic.....	.....	23.79	4.33	4.57
Palmitic.....	.....	66.90	12.19	12.79
Stearic.....	.....	9.31	1.70	1.78

### Summary

The characteristics and composition of expressed papaya seed oil from Puerto Rico have been determined.

### Acknowledgment

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## Abstracts

### Oils and Fats

Edited by

M. M. PISKUR and SARAH HICKS

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