

THE OIL OF *MIMUSOPS ELANGI* (LINN.)

BY A. R. SUKUMARAN KARTHA

AND

K. N. MENON

(Maharaja's College, Ernakulam)

Received November 11, 1943

Mimusops Elangi (Linn.) belongs to the natural order Sapotaceæ and is indigenous to the Deccan peninsula. The oil from the seed is edible and is also used for purposes of lighting besides finding use in medicinal practice. The oil has got a reddish brown colour and a very disagreeable odour, though it is more or less tasteless. Since it can be easily obtained in large quantities at a relatively low cost, refinement so as to produce an odourless, colourless oil will prevent wastage of seeds and thus lead to national economy. The oil is not much improved by simple process of refinement. Steam distillation followed by treatment with absorbant charcoal leaves a colourless oil free from all odour and taste and more mobile than the crude oil. On remaining exposed to air, however, it acquires a yellow tint.

Elangi oil was first investigated by Kesava Menon¹ (1910) who however determined only the constants. Rau and Simonsen² (1922) obtained a 16% yield of oil containing stearic, palmitic and oleic acids and a small amount of an acid not definitely identified. For the present investigation seeds collected locally during the season were extracted with benzene. (See Table I for constants.) The solid and liquid acids and were separately esterified

TABLE I
Constants of Elangi Oil

	Rau and Simonsen	Kesava Menon	Present work	
			1. Crude oil	2. Refined oil
Density	0.9113 (28° C.)	D $\frac{1000}{1000}$ 0.9129	0.9833	0.9895
Refractive Index	1.4544	..	1.4666	1.4675
Acid Value	2.2	45.5	12.74	0.75
Iodine Value	82.8	66.5	80.43-83.58	81.10
Saponification Value	188.0	213.9	192.0	196.9
Acetyl Value	12.0	..	..	..
Unsaponifiable matter	1.30	1.56	1.6	..
Fatty acids (Insoluble) per cent. .. ..	..	89.4	93.28	93.11

and analysed giving the composition of the total acids as palmitic 10.97%, stearic 10.10%, behenic 0.46%, oleic 63.98% and linolic 14.49%.

The seed fats of mimusops is interesting since they contain fats with iodine value varying from 45 to 85. Usually the maximum variation in the iodine value of the fats from a given species is only about 20. The component acids of all the *Mimusops* oils as well as those of a few typical *Sapotaceæ* oils are included in Table III. *Mimusops* oils contain arachidic

TABLE II
Component Acids of Mimusops and a Few Sapotaceæ Oils

Name	C ₁₆	C ₁₈	Oleic	Linolic	Other acids	Authority
<i>M. Hexandra</i>	19.0	14.1	63.1	2.7	1.1 (C ₂₀)	Patel (<i>loc. cit.</i>)
<i>M. Heckelu</i>	4.2	35.5	58.5	Trace	1.1 (C ₂₀) and 0.7 Hexadecenoic	Atherton and Meara (<i>loc. cit.</i>)
<i>M. Elangi</i>	11.0	9.99	63.98	14.57	0.46 (Behenic)	Present work
<i>Sideroxylon ferrugineum</i> ..	Ca 26	..	57.0	17.0	..	Kafuka and Hata ¹
<i>Palaquinoxylon folium</i> ..	6.5	57.5	36.0	..	..	ReJong and De Haas ²
<i>Madhuca latifolia</i> ..	23.7	19.3	43.3	13.7	..	Hilditch and Ichaporia ³
<i>Butyrospermum Parkii</i> ..	8.5	35.9	49.9	5.3	0.4 Myristic	Hilditch and Saletore ⁴
<i>Calocarpum mammosum</i> ..	10.0	22.3	54.3	13.4	..	Jamieson and Mc Kinney

¹ K. Kafuka and C. Hata, *J. Chem. Soc. Japan*, 1935, 56, 1081.

² A. W. K. De Jong and W. R. T. de Haas, *Chem. Ztg.*, 1904, 28, 780.

³ T. P. Hilditch and M. R. Ichaporia, *J. Soc. Chem. Ind.*, 1938, 57, 44.

⁴ T. P. Hilditch and S. A. Saletore, *ibid.*, 1931, 50, 4687.

⁵ G. S. Jamieson and R. S. Mc Kinney, *Oil and Fat Ind.*, 1931, 8, 255.

acid as acid higher than C₁₈-acids. Elangi oil contains behenic acid instead and thus forms an exception to the fairly general rule that an oil containing C₂₂ contains C₂₀ acid also.

No *Mimusops* oil seems to have been investigated for glyceride constitution. Elangi oil does not seem to obey the rule of even distribution, and in this respect resembles Phulvara butter (from *M. Butyraceæ*) which has been shown by Bushell and Hilditch³ (1938) not to obey the rule of even distribution closely. An oil containing less than 30% of saturated acids has not so far been shown to contain more than 1 or 2% of completely saturated glycerides but Elangi oil containing only 21.45% of saturated acids is found to contain 4.25% of completely saturated glycerides. The proportion of

disaturated glycerides is also high. It has been recently shown⁴ (1943) that oxidation of 80.0 g. of oil yielded 22.8 g. of an azelaoglyceride mixture containing 10.53 g. of mono-azelaoglycerides corresponding to 14.34% of disaturated glycerides in the oil. This is not the first time that a seed fat with less than 33% of saturated acids has been found to contain a large percentage of disaturated glycerides. Neem oil containing only 30% of saturated acids has been shown by Hilditch and Murthi⁵ (1939) to contain 1.7% of disaturated glycerides, but the present investigation seems to be the first instance when the occurrence of linolic disaturated glycerides in a seed fat is definitely indicated. Elangi oil yielded, after three crystallisations from acetone 25% of a sparingly soluble portion which contained 25% of linolic acid. In the case of neem oil (*loc. cit.*) the sparingly soluble portion contained less than 4% of linolic acid. It is probable that the linolic acid glycerides in Elangi oil have been rendered comparatively sparingly soluble by the associated high saturated acid content. The fact that no portion of the fat showed an iodine value of more than 86 shows that probably there is no linoleo-diolenin or more unsaturated glyceride molecule in the fat, the linolic acid being combined at least with one saturated acid radical in building up the glyceride molecule.

Experimental

150 g. of sun-dried, crushed seed kernel gave on extraction with benzene 37.6 g. of oil (25.07% yield). 374 g. of the oil was saponified, the soap ether extracted and then the free acids liberated, yielding 349 g. of water insoluble fatty acids corresponding to 93.28%.

Constants of Mixed Acids.—Titre—24.2°; Refractive Index—1.4578; Mean Molecular Weight—278.0; Iodine Value—86.6.

309.3 g. of the mixed acids gave 65.45 g. of solid acids and 243.85 g. of liquid acids corresponding to 21.16% and 78.84% respectively.

Solid Acids.—Mean Molecular Weight—296.6; Iodine Value—0.90; Titre—48.4°; Refractive Index—1.4434.

Liquid Acids.—Mean Molecular Weight—281.1; Iodine Value—106.5; Refractive Index—1.4625.

On analysing the methyl esters of the acids separately by the ester fractionation method, the solid acids were found to consist of 49.4% palmitic, 47.74% stearic, 2.16% behenic and 0.79% unsaturated acids; while the liquid acids were found to consist of 0.69% palmitic, 81.10% oleic and 18.21% linolic acids. Thus composition of total acids is found to be

palmitic 10·97%, stearic 10·10%, behenic 0·46%, oleic 63·98%, and linolic 14·49%.

80·8 g. of the dry, purified, neutral oil was oxidised giving 3·4 g. of a residue of completely saturated glycerides corresponding to 4·25% by weight.

Summary

The constants, acid composition and trisaturated glyceride content of Elangi oil are reported.

REFERENCES

1. Kesava Menon .. *J. Soc. Chem. Ind.*, 1910, **28**, 1430.
2. Rau and Simonsen .. *Indian Forest Records*, 1922, **9**, 95.
3. Bushell and Hilditch .. *J. Soc. Chem. Ind.*, 1938, **57**, 48.
4. Kartha and Menon .. *Proc. Ind. Acad. Sci.*, 1943, **A 17**, 114.
5. Hilditch and Murthi .. *J. Soc. Chem. Ind.*, 1939, **58**, 310.