217. *The Seed Fats of* Salvadora oleoides *and* Salvadora Persica.

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The seed fats of *Salvadora oleoides* and *Salvadora Persica* are rich in combined myristic acid, with lauric and palmitic acids as subsidiary major components. Their component acids were found to be: decoic 1·5, 1·0; lauric 21·2, 19·6; myristic 52·9, 54·5; palmitic 18·9, 19·5; and oleic 5·5, 5·4% (by weight).

Salvadora oleoides and *S. Persica* (Indian names respectively jhal and pilu), of the natural family Salvadoraceæ, are small wild shrubs found in the Punjab, Sindh, Trans-Indus valleys and some parts of S. India. They bear currant-like fruits with thin viscid fruit coats in May and June. The fruit coats did not yield any fat when extracted with light petroleum, but gave about 1% of resinous material on extraction with acetone. The seeds of both species are much alike and resemble yellow mustard seeds in size and colour.

Hooper (*Agric. Ledger*, 1908, **15**, 1) first studied the characteristics of these fats. Later Patel, Iyer, Sudborough, and Watson (*J. Indian Inst. Sci.*, 1926, **9A**, 117) made a detailed study of *S. oleoides* seed fat, and stated that the component acids included octoic 4·4, decoic 6·7, lauric 47·2, myristic 28·4, oleic 12·0, and linoleic 1·3%. The general characteristics of both seed fats, as reported by these workers and as observed in the present study, are collected in Table I, from which it will be seen that, whilst Hooper's seed fats resemble those now examined, that studied by Patel *et al.* differed considerably from either, especially in that it contained more than twice as much unsaturated (oleic) acid.

Table I.

Characteristics of S. oleoides *and* S. Persica *seed fats.*

	S. oleoides.			*S. Persica.*	
Characteristics.	Hooper.	Patel *et al.*	Present work.	Hooper.	Present work.
Fat:					
Acid value	11·26	2·02	1·0	9·3	2·2
Sap. equiv.	231·1	226·6	240·6	228·3	243·1
Iod. value	7·5	14·0	5·5	5·9	6·1
Polenske value	—	11·6	—	—	—
Reichert–Meissl value	1·3	5·1	—	—	—
Solidifying point	41·0	31·1	—	—	—
Unsaponifiable matter, %	—	—	0·7	—	0·8
Fatty acids:					
%	94·1	89·8	—	—	—
Setting point	40·0°	27·9°	—	—	—
Iod. value	8·3	14·1	5·0	—	5·5
M.M. Wt.	233·6	219·6	226·2	—	228·6

By the courtesy of Dr. R. M. Gorrie (Divisional Forest Officer, Silva Research Division, Lahore, Punjab) fruits of both species, which were collected in July, were obtained for analysis. When received, the fruits were slightly moist. The sticky fruit coats were carefully removed.

The seeds formed about 44—46% of the whole fruit and on an average 100 seeds weighed 3·2 g. The seeds were ground and separately extracted with light petroleum (b. p. 40—60°) in a Soxhlet extractor. Those of *S. oleoides* yielded 41·0%, and those of *S. Persica* 39·3%, of a pale yellow, solid fat. Each fat was submitted to detailed analysis as described below.

Table II.

Fractional distillation of total methyl esters from S. oleoides *seed fat.*

Fraction No. *S.O.*	Wt., g.	B. p.	Sap. equiv.	Iod. val.	Fraction No. *S.O.*	Wt., g.	B. p.	Sap. equiv.	Iod. val.
1	1·25	60—74°	206·6	—	6	2·19	96—98°	243·4	—
2	2·93	74—75	213·7	—	7	2·35	98—110	261·9	1·7
3	1·79	75—96	232·5	—	8	3·29	Residue	280·3	29·2
4	3·44	96	241·1	—					
5	3·91	96	242·3	—		21·15			

Component Acids of S. oleoides *and* S. Persica *Seed Fats.*—24 G. of each fat were saponified, and, after removal of unsaponifiable matter from the soaps by extraction with ether, the mixed acids were liberated. These were then converted into methyl esters, and the latter fractionally distilled at 0·1 mm. pressure through an electrically-heated and packed column.

TABLE III.

Fractional distillation of mixed methyl esters from S. Persica *seed fat.*

Fraction No. S.P.	Wt., g.	B. p.	Sap. equiv.	Iod. val.	Fraction No. S.P.	Wt., g.	B. p.	Sap. equiv.	Iod. val.
1	1·77	60—76°	210·5	—	6	2·96	96°	241·7	—
2	1·70	75—76	216·1	—	7	1·87	96—106	248·3	—
3	1·49	76—94	226·1	—	8	2·10	106—108	269·1	2·2
4	2·58	94—96	241·2	—	9	2·75	Residue	288·9	34·1
5	3·33	96	241·8	—		20·55			

Certain of the individual ester fractions were qualitatively examined as follows :

Fractions S.O./2 and S.P./2. The acids obtained by hydrolysis of these fractions melted at 44°. On crystallisation from 70% alcohol and in admixture with an authentic sample of lauric acid the m. p. did not change.

Fractions S.O./4 and S.P./4. Myristic acid, m. p. 53°, was obtained when the acids from these fractions were crystallised from 80% alcohol.

Fractions S.O./7 and S.P./7. Palmitic acid, m. p. 62·5°, was obtained after repeated crystallisation of the acids obtained from these fractions from 92% alcohol.

Fractions S.O./8 and S.P./9. These residual fractions contained esters which, when freed from unsaponifiable matter, possessed sap. equiv. 279·2, 279·5, and iod. val. 28·5, 33·5. The acids from these fractions were separately oxidised in solution in dilute alkali at 0° by potassium permanganate, and the products of oxidation extracted with light petroleum to remove saturated acids (no saturated acid higher than palmitic was detected). The products insoluble in light petroleum were treated with boiling water. The insoluble fraction yielded on repeated crystallisation from ethyl acetate an acid which melted at 130° (unchanged when mixed with 9 : 10-dihydroxystearic acid, m. p. 132°). No tetrahydroxystearic acid was obtained from the hot water extract, and the only unsaturated acid detected was, therefore, Δ^9-oleic acid.

With the help of the above quantitative and qualitative data, the proportions of the component acids (excluding unsaponifiable matter) of both seed fats are calculated as given in Table IV.

TABLE IV.

Component acids of S. oleoides *and* S. Persica.

Acids.	*S. oleoides* seed fat acids.		*S. Persica* seed fat acids.	
	% (wt.).	% (mol.).	% (wt.).	% (mol.).
Decoic	1·5	2·0	1·0	1·3
Lauric	21·2	24·1	19·6	22·3
Myristic	52·9	52·7	54·5	54·6
Palmitic	18·9	16·8	19·5	17·4
Oleic	5·5	4·4	5·4	4·4

Since the amounts of mixed acids available were small, the final compositions are of an approximate order. It is clear, however, that the seed fats of these two species of *Salvadora* are almost identical in composition. It is also evident that the data given differ markedly from those of Patel *et al.*, not only in the smaller proportions of oleic acid, but also in that the proportions of myristic and lauric acids are almost reversed; moreover, these workers were unable to detect any palmitic acid. In the light of the present results, the component acids of both species contain somewhat over 50% of myristic acid, with approximately 20% each of lauric and palmitic acid (by weight); oleic and decoic acids are the only minor component acids present.

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