

THE OIL OF NAHOR SEED (MESUA
FERREA) AND ITS APPLICATION IN
THE MANUFACTURE OF GRAINED SOAP

By

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**The Oil of Nahor Seed (*Mesua Ferrea*)
and its application in the manufacture of
grained soap**

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The Oil of Nahor Seed (*Mesua Ferrea*) and its application in the manufacture of grained soap.

The Nahor (*Mesua ferrea*) is a large evergreen straight-stemmed tree growing to a great height. In the wild state it is found in the evergreen forests of the Eastern Himalayas and in the forests of Assam, specially in the Charduar and Nambar forests, Khasia Hills, Chittagong Hill Tracts, the Ghats forests of the west coast, more common in Malabar than in Kanara, in Tenasserim, Upper Burma and in the Andamans. In the cultivated condition it is found chiefly as an ornamental tree in some parts of India and Burma under various local names, e.g., Nageswar in Bengal and Nagakesar in the Telugu-speaking districts. The timber is extremely hard and heavy and the tree is commonly known as the Iron-wood tree.

In South India, Wynaad and Palghat divisions, the tree flowers in the months of February and March and in some other areas in April and May. The flowering is followed two months later by fruiting. The flowers are white and large, and the fruits reddish and wrinkled and not unlike chestnuts. The Assam fruit has, in comparison with the South Indian (Malabar) variety, a glossy and less wrinkled surface. The fruit contains from one to three seeds. The composition of the latter appears to vary considerably according to the place of origin. Dhingra and Hilditch* found the following values for the South Indian (Malabar) and Eastern Bengal seeds.

TABLE I.

Composition of South Indian and Bengal Mesua Ferrea seed.

Origin.	Shell.	Kernel.	Oil.	
			Of kernel only.	Of whole seed.
	Per cent.	Per cent.	Per cent.	Per cent.
Malabar	27	73	63	46
Bengal	47	53	65	34.5

The Bengal seed, again, shows no small variations, as the figures in Table II will show. Dhingra and Hilditch have not mentioned the actual source of the Eastern Bengal seed they worked upon. A consignment of the seed received in the Industrial Research Laboratory

*J. Soc. Chem. Ind. 1931, T. 9-12.

of this Department from the Divisional Forest Officer, Chittagong Hill Tracts, has been found on analysis to have the following composition:—

TABLE II.

Composition of Bengal Mesua Ferrea (Nahor) seed.

Source.	Shell.	Kernel	Oil.	
			Of kernel only.	Of whole seed.
	Per cent.	Per cent.	Per cent.	Per cent.
Chittagong Hill Tracts	44.9	55.1	76.7	39.7

The shape of the seed varies, in the case of a single seeded fruit, from a cone to a spheroid with a protruding end. In the case of the double or tripple seeded fruits, the seeds together make up the above shapes. The largest of the diameters of a seed is about an inch and often less. The seed has a shell, moderately hard and brittle, and of a thickness varying from 1/30th to 1/20th inch. It can be broken easily, the pressure of the fingers sometimes sufficing to break it. The kernel inside the shell is usually of the same shape as the seed, only it is somewhat flat. It is light yellow in the fresh condition and dark on aging, and is liable to be destroyed by insects, the ravage being often undiscoverable without breaking the shell. The kernel contracts on drying, so that in a fairly dried seed no part of the kernel remains fixed to the shell. It therefore separates from the shell as soon as the latter is broken. The oil resides in the kernel.

The oil being as yet used only in negligibly small quantities as an embrocation and for application to sores, etc., the exploitation of the seed is meagre and no efficient method of decortication is in vogue. Systematic exploitation will need better decorticating methods than the application of the mallet or the light club. Crushing between two grooved rollers revolving in opposite directions much the same way as in a cane-crusher would perhaps be found a convenient method of decorticating the seed. The kernel is of a good size and can be easily handpicked from the mass of broken shell.

Notwithstanding the variations in composition noticed above Nahor seed is one of the richest in oil having, as mentioned before, an oil content of 76.7 per cent. The oil is so profuse that it can be pressed out from the kernels, specially the dark ones, by the fingers. The people who used this oil for lighting purposes before the advent of kerosene often burnt the dried kernel without undergoing the trouble of expressing the oil.

No dependable data are available regarding the yield of the oil from the seed by expression in the country ghani. Judging, however, from the results in the case of another seed of almost equally high oil-content, viz., the Punnal seed (*Calophyllum inophyllum*), the expression in the ghani cannot be expected to be thorough. In the case cited no less than 19 per cent. of the total oil remained in the cake, and was therefore a waste. The Nahor seed was, however, treated in an experimental

hydraulic press working at a pressure of 2 tons per square inch. The dried seed without the shell yielded on double expression a total of 66.4 per cent. oil, 55.4 per cent. being the yield of the first expression. This result works out to an yield of 34.3 per cent. on the undried seed in the shell as against 39.7 per cent., the total oil-content.

The cake is poor in phosphorus and potash but has a fairly high nitrogen content, viz., 3.64 per cent., and can be usefully employed as a manure.

Nahor oil is somewhat thick, and has a dark-brown colour. It has a not-disagreeable smell and a mild pungency like that of mustard oil. The oil contains substantial proportions of highly coloured resins which considerably modify its properties and behaviour. These resins do not yield to any of the usual, industrial, purification methods. Their separation by treatment with sodium carbonate is impracticable as the resin soap formed on the addition of the carbonate keeps the remainder of the oil in an emulsified condition from which it is difficult to separate either the oil or the soap.

The application of the oil in the soap industry, with special reference to its utilisation as a raw material for the common washing soap, has been examined in the Industrial Research Laboratory. The oil expressed in this Laboratory from the seeds from Chittagong Hill Tracts gave the following chemical constants:—

Saponification value	...	230
Iodine value	...	96.3
Titer	...	22°C.

The first two values give an I. N. S. factor of 134 which is higher than that for Mowha oil. As oils with higher I. N. S. factors are preferred to those with lower ones the Nahor oil as a soap stock ought to have precedence over Mowha oil, but the presence of the resins brings in complications and detracts from its value. On an examination of the saponaceous properties of Nahor oil it appears that while the deep colour that the oil imparts to its soap is a handicap to the use of the oil as a raw material for soaps of a pale colour, the other properties of the soap, viz., latheration, emulsification and detergency, are such as to warrant the use of the oil in considerable quantities in the production of soaps in which a little colour is not considered a disqualification, as, e.g., the common washing soaps.

The oil has a high acidity due to the presence of the large proportion of resins. It is, therefore, unsuitable for making soap by the cold process.

In the boiling process the saponification of the oil is devoid of any extraordinary feature. An intensely yellow coloured emulsion is formed immediately on the addition of caustic lye to the oil. Similar development of colour takes place when the oil itself is brought in contact in the cold with an alkali such as sodium hydroxide or carbonate, solid or in solution, or ammonia. With the progress of the boiling in course of saponification the colour deepens until a deep reddish brown soap is obtained. The colour of the soap loses in intensity as it is subjected to brine wash. The final soap is still of a brown colour. The soap grains out quite easily both with brine and with strong caustic lye, the grains being very soft and of a large size. They can easily be stirred into a soft, claylike, consistence and cast into moulds. The

moulded soap is rather soft when fresh but hardens on staying. The soap has a mild aromatic odour.

An examination of the soap revealed the following characteristics. It is sloppy and produces a thick, greasy, and moderately foamy lather. The emulsifying power and detergency are high, and the washing properties are in no way inferior to those of the soaps of well known stocks. The soap should, therefore, find considerable use in household washing and also in the dhobikhanas.

The graining point of the soap of this oil, i.e., the temperature at which the grained soap begins to solidify in brine, is 49°C. For purposes of reference the graining points of some well known stocks are given in Table III below:—

TABLE III.

Graining points of some well known soap stocks.

<i>Soap stock.</i>	<i>Graining point.</i>
Cocconut oil	82°C
Tallow	66.5°C
Mowha oil	57°C
Neem oil (revised)	54°C
Punnal oil	54°C
Rayna oil	52°C
Mustard oil	51°C
Cottonseed oil	47.4°C
Groundnut oil	45°C
Til oil	44°C
Karanja oil	39°C

In combination with other stocks Nahor oil can produce very serviceable soaps. The colour of such soaps will be more or less brown according as more or less of this oil is used, and the smell agreeable, for the aromatic odour of the Nahor soap successfully masks the soapy odour due to the other stocks. A few typical blends are given below showing how this oil can be used in large proportions along with rosin to make cheap and serviceable soaps of high cleansing properties. It is not recommended to use this oil beyond small percentages in cases where a brown colour in the soap will be considered a disqualification—

(1)

<i>Stock.</i>	<i>Parts.</i>
Tallow	... 14
Mowha oil	... 20
Cocconut oil	... 15
Rosin	... 10
Nahor oil	... 41
	100

(2)

<i>Stocks.</i>		<i>Parts.</i>
Tallow	...	16
Mowha oil	...	19
Cocconut oil	...	12
Rosin	...	12
Nahor oil	...	41
		<hr/>
		100
		<hr/>

(3)

Mowha oil	...	39
Cocconut oil	...	12
Rosin	...	16
Nahor oil	...	33
		<hr/>
		100
		<hr/>

(4)

Tallow	...	14.5
Mowha oil	...	21
Cocconut oil	...	7.5
Rosin	...	14
Nahor oil	...	43
		<hr/>
		100
		<hr/>

(5)

Tallow	...	14
Mowha oil	...	29
Rosin	...	15
Nahor oil	...	46
		<hr/>
		100
		<hr/>

(6)

Tallow	...	26
Rosin	...	16
Nahor oil	...	58
		<hr/>
		100
		<hr/>

(7)

Tallow	...	40
Nahor oil	...	60
		<hr/>
		100
		<hr/>

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No.

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No.

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