
Non-Traditional oilseeds and oils

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These crops not only supply oil they also contains non-lipid constituent. The residual cake is used as animal feed. Some of these seeds show antifeedent and pesticides abilities.

1. Sal (*Shorea Robusta*) seed fat

It belongs to the species of shorea (Dipterocarpaceae). It is semi-deciduous, gregarious tree, sal timber used as sleepers in railway tracks. It is attacked by white ants. Sal is a source of oleoresin known as Sal Dammar obtained tapping. Sal oil is known as Chua oil consist of mixture of 155, 3,4-dimethoxy and propyl benzene, 40% oxygenated aromatic compounds and 26% azulene.

Fatty acid composition of Sal seeds is as under:

Palmitic	4.5 %
Stearic	44.2 %
Oleic	42.2 %
Arachidic	6.3 %
Linoleic	2.8 %

Reference: Hilditch. T.P and Y.A.H.Zaky. J.Soc.Chem.Ind, 61,34,1942

GLC data is as under:

C16	6.4-7.5 %
C18	45.0-47.1 %
C18:1	28.4-39.1 %
C18:2	1.9-3.2 %
20	5.5-5.8 %

Reference : Proceedings of the Seminar on "Sal seed" held at H.B.Technolo.Institute, Kampuir, 1969, published by oil techol.Assn.of India Central Zone, HABTI, Kanpur

Other characterstic of Sal fat

Characteristic	Requirement Refine grade	Requirement raw grade
Moisture and volatile matter, max. %	0.1	1.0
Acid value (A.V) max.	1.4500	1.4600
Saponification value	35 to 45	35 to 45
Unsaponifiable matter, max	46-53	46-53
9,10 epoxy and 9,10, dihydroxy stearic acid max%	3.0	3.0

Reference: Nasirullah, T. Malika S. Rajala Kshmi, Vibhakar, M.N. Krish-namurthy, K.V. Nagraja and O.P. Kapur, J.oil.Techol.Assn.of India 13,120,1981.

Constitutes of 3-Ketotriterpene of various fat

Unsap matter in fat %
3-Ketotriterpene, unsap matter %
Composition of 3-Ketotriterpene
Alpha Amyreone.
Beta-Amyrenone
Lupenone
Butyrospermenone
Cycloartenone
24-Methylene cycloartanone.

Reference: Qureshi G.A, Hindustan Levir, Research centre,Bomby, Private communication, also Srinivulus.C and S.N.Mahaptra, oil seeds and their utilization, Ed,Rik, Suri,K.C.mathur, Rohini Pubin.House Dehradun 146,1984.

Sal meal

Moisture	7.9-9.6 %
Protein	7.9-9.2 %
Ash	2.3-3.1 %
Crude fibre	9.9-2.2 %
Total carbohydrate	54.1-58.4 %

Reference: Qureshi G.A, Hindustan Levir, Research centre,Bomby, Private communication, also Srinivulus.C and S.N.Mahaptra, oil seeds and their utilization, Ed,Rik, Suri,K.C.mathur, Rohini Pub in.House Dehradun 146,1984.

Sal seed composition as g per 100g defatted meal

Methonine	0.11 g
Cystine	0.1 g
Lysine	0.39 g
Arginine	0.63 g
Threonine	0.3 g
Valine	0.54 g
Isoleucine	0.31 g
Leucine	0.73 g
Phenylalanine	0.42 g

Reference: Qureshi G.A, Hindustan Levir, Research centre,Bomby, Private communication, also Srinivulus.C and S.N.Mahaptra, oil seeds and their utilisation , Ed,Rik, Suri,K.C.mathur, Rohini Pub in.House Dehradun 146,1984

2. Madhuca Indica seed fat

The two major species of genus Madhuca (Sapotaceae) are: Madhuca Indica (Syn. Bassia latifolia, Madhuca latifolia) and Madhuca longifolia (Syn. Bassia longifolia)

The range of fatty acid composition.

C16	23.7-24.7 %
C18	19.3-29.9 %
C18:1	36.3-43.3 %
C18:2	11.6-15.8 %

Ref: Lakshminarayna G.J.Oil.Technol, Assh,India 9,75,1977

Mowrah cake

Moisture	7.2-11.1%
Fat	8-13.3%
Protein	15-17.4%
Fibre	5.3-5.9%
Ash	6.4-6.8%
Saponin	4.6%
Carbohydrate	48.7-54.6%

Ref: The wealth of India "Raw Materials, council of Scientific and Industrial Research, New Delhi, 6,207,1962

The amino acid content of defatted cake hydrolysate are as under:

Aspartic	8.4%
Threonine	3.25%
Valine/Methionine	7.35%
Serine	2.7%
Arginine	6.6%
Histidine	6.3%
Glutamic acid	19.0%
Lysine	6.6%
Alanine	6.5%
Glycine	1.8%
Tyrosine/Tryptophan	17.6%
Proline	2.5%

Ref: Chand, Subash and S.N.Mahapatra ,oil and oilseed, J.26,15,1974.

3. Mango (*Mangifera Indica*) Kernel fat

The mango tree *Mangifera Indica*. The species contains 41 Varieties. The dry kernel constitute 75% of stone and oil content of the Kernel is about 10%

The composition of Kernel oil is as under

Carbon	Alphonso
C16	5.4
C18	44.0
C18:1	43.7
C18:2	3.7
C20	3.2

Ref: Mehta, D.T.G, Ranchandan and N.V.Bringi, Hindustan Lever Ltd, Bomby, Private communication .

Mango kernel fat characteristic

Unsaponification matter %	0.75-2.4
Sterol %	0.22-0.58
Specific gravity 30C°	0.901
Melting point	34-43C°

Ref: Smith, R.Unilever Research laboratory, colworth house U.K, private communication.

- Coleman M.H.J.Amer, oil, chem. Soc, 42,751,1965
- Kartha, G, G.N.Rimachandrun A.B, Bhat, P.M.Nasir V.K.V.Raghavan and K.Venkatarman, Tetrahedron Lett, 459, 163.
- Ranna Ruo, A.V.G.Venkataswamy and A.D.Pandse Tetrahedron Lett, 21,1975,1980.

Composition of the kernel in percent .

Item	Percent
Protein	9.5
Fat	10.75
Starch	72.8
Sugar	1.0
Tannins	0.1
Ash	3.6
Calcium	0.23
Magnesium	0.34
Phosphorus	0.61
Total digestible nutrient	70.0
Starch equivalent	67.0

Reference: The wealth of India, Raw materials, CSIR, New Delhi, 6,265,1962.

4. *Garcinia Indica* Choisy (Kokum), *Vateria Indica* (Dhupa) and *Bassia Butyracea* (Phulwara) seed fat.by N.V.Bringi and D.T.Metha

Expelled	Solvent extracted
Moisture and insoluble %,0.5max	0.75 max
Unsaponification matter 32-40	32-40
Saponification value 187-191	187-191

Ref: Indian Standards specification 8591,1980.

Carbon	Percentage
C16	3.4
C18	67.4
C18:1	28.1
C18:2	0.6
C20	0.3

Ref: Smith, R,Unilever Research Laboratory, Colworth House, U.K.Private communication.

Seed cake

Used as manure. The defatted seed meal contains

Protein	16.5%
Lysine	0.33%
Arginine	1.6%
Threonine	0.43%
Cystine	0.123%
Methionine	0.15%
Valine	0.57%
Isoleucine	0.4%
Leucine	1.0%
Phenylanine	0.67%

Reference: Wealth of India, Raw materials, council of Scientific and Industrial Research Puyblication, New Delhi, 4,101,1956.

5. Fruit Rinds.

The genus *Garcinia* (family guttiferae) is known to produce a variety of polyisoprenylated polyphenols. From fruit rinds *Garcinia Indica* (Kokum) two compound garcinol and isogarcinol.

6. *Vateria indica* (Dhupa)

Characteristic of the fat.

Melting point C°	30-40
Saponification value	187-192
Unsaponification matter%	0.6-2.5

Reference: Wealth of India, Raw materials, council of Scientific and Industrial Research Publication, new Delhi 4,101,1956

Fatty acid compositions.

C16	9.0 %
C18	46.9 %
C18:1	41.4 %
C18:2	1.3 %
C20	1.4 %

Reference: Coleman, M.H.,J.Am.oil chem.Soc.42,751,1965

Seed cake

Protein	6.7%
Nitrogen free extract	73.8%
Resinous	Small amount

Reference: Saxena, V.C,R.N,Pat and V.Mahadevan,Ind, Vet, J,46,1081,1969.

Fruit shell and bark

Tanin	25%
Phenolic	dl-epicatchin
Constituent	Fishetinidol(-) epiafzelechin (-)
2',6-4 Trihydroxy chalcone	Trihydroxy chalcone
2,3,4,4'	Tetra hydroxy stilbene

Reference: Wealth of India, Raw materials, council of Scientific and Industrial publication, New Delhi, 4,101,1956

7. *Bassia butyracea* (Phulwara)

Fatty acid composition

C16	60.8%
C18	3.2%
C18:1	30.9%
C18:2	4.9%

Reference: Bhambani, T.K,A.D.Shitde and V.V.R.Subrahmanyam and J.G,Kane , J.Oil.Technol.Assn.of India, 2,8,1970.

Flower are rich source of sugar, and sold as chewri gur and honey is also collected from its flowers.

Reference:Bole.P.V.Private communication.

8. *Neem* (*Azadirachta Indica* Juss)Seed oil by N.V.Bringi and M.S.Thakur.

The component weight percent of fruit parts is as under:

Pulp and skin	51.2 %
Seed	40.0 %
Kernel	17.0 %

Fatty acid and glyceride composition

Fatty acid	Crude oil %	Refined oil %
Palmitic	14.9	16.2
Stearic	14.4	14.6
Arachidic	1.3	3.4
Oleic	61.9	56.6
Linoleic	7.5	9.0

Reference: Mitra ,C.R."Neem,published by Indian central oilseed committee, Himayatnagr, Hyderabad, 1963.

Neem seed contain following compounds:

- 17,beta hydroxy azadiradione.
- 17,epi azadiradione
- 7 desacetyl
- 7 benzoyl
- azadiradine
- 1-alpha-methoxy 1-2 dihydro epoxyazadiradione
- Diepoxyazadiradione
- 7 desercetyl

- 7 benzoylepoxy
- azadiradione
- 7 acetyl neo trichillinone
- 7 dcsacetyl
- 7 benzoyl
- gedunin

Reference: Prasad, R.B.N and S.Venkob Rao, J.Oil Technol.Assn. of India 13,101,1981 and Kalbnag, SS.,P.A.Vatakencherry. A.Varadarajan D.T.Mehta and K.S.Jonardhanan Hindustan, Lever Research Centre, Bomby, unpublished work.

Neem cake

Crude protein	13-35%
Carbohydrate	26-50%
Crude fibre	8-26%
Fat	2-13%
Ash	5-18%
Acid insoluble ash	1-7%

Reference: Vatakencherry Paul and D.T.Mehta, Hindustan Lever Research centre, Bombyt unpublished.

Karanja seed (*Pongamia Glabra*) oil by N.V.Bringi and S.K.Mukerjee.

Dried kernels

Moisture	19.0%
Oil	27.5%
Protein	17.4%
Starch	6.6%
Crude fibre	7.3%
Ash	2.3%

Reference: The wealth of India "Publication and Information Directorat CSIR, New Delhi, 8,208,1969. And O.P Vimal and K.T.Naphade J.Sci.Ind.Res 39,197,1980 in utilixation of nonedible oil seed including Karanja.

Characteristic of crude oil

Specific gravity 30C°	0.925-0.940
Saponification value	185-195
Unsaponification matter	3.0%

Reference Indian Standards specificatiuon IS-3492-1965.

Fatty acid composition

C16	10.6 %
C18	6.8 %
C18:1	49.0 %
C18:2	19.0 %
C20	4.1 %
C20:1	1.4 %
C22	5.3 %
C24	2.4 %

Reference: The chemical constitution of natural fat, T.P.Hilditch and P.N.Williams, IVED.Chapman and Hall, London, 314,1964

9. Technology used for Karanja soap.

- 1) Hydrogenation of crude oil
- 2) Distilled fatty acid from 1
- 3) High temperature/cacuum stripping of non-lipids
- 4) Distilled fatty acids from 3

Chemical compounds found in Karanja plants.

Root, stem and stem bark	Kanugin
	Desmethoxy kanugin
	Tetra-o-methyl fisetin
	Karanjin
	Pongapin Glabra II Glabra IV, 5 –methoxy-3',4'methylenedioxy furano flavone
	Glabra III,5-methoxy furnao flavone Pongamol Glabra I
	Pinatine
	Gamatine
	Pongaflavone (Karanja chromene)
	Pongachromene

Heartwood	Kanugin
	Desmethoxy Kanugin
	Pongaglabrone
	Pongachromene
	Lonchocarpin
	Pongachalkone-II
	Pongachlkone-I
	Glabra chromene-II
Leaves	Karanjhin
	Kanjone
	Pongapin
	3-methoxy pinatin
	Glabra-chromene-I
	Glabrachromene-II
	Gama-Sitosterol
Flowers	Kaempferol
	Populnin
	Queremeritrin
	Karanjin
	Kanjone
	Pongaglabrone
	Gamatin
	Gama –Sitosterol
Seed and Seed oil	Karanjin
	Kanjone
	Pongapin
	Pongaglabrone
	Lanccolatin-B
	2-methoxy furano flavone
	Pongol
	Pongamol
	Karanjachromene
	Isolonchocarpin
	Isopongaflavone
	Glabin
	Isopongachromene
	Glabrachalkone

References

- The Wealth of India, Publication and information Directorate CSIR, New Delhi ,8,208,1969 see also O.P.Vimal and K.T.Naphade J.Sci.Ind.Res.39,197,1980 for a review on recent trends in utilisation of nonedible oil seeds, include karanja
- Khanna and T.R Seshadri, *Cirr.Sci*, 33,644,1964
- Tree borne oilseeds,Khadi and village industries commission Bombay 1978.
- Menon, V.P.Private communication, Estimate by Association of minor oils and seeds development of India.
- Indian Standards specification IS-3492,1965
- The chemical constituion of naturral fats, T.P.Hilditch & P.N.Williams, IV ED.Chapman & Hall, London, 314,1964,
- Mitra, C.R., Neem, Published by Indian central oilseeds committee, Himayatnagar, Hyderabad.1963
- Vatakencherry, P.A and D.T.Mehta, Hindustan Lever Research centre, Bombay , unpublished work.
- De Sa,B.J.and J.G.Kane, *Indian oil & soaps j.*,25,197,1959.
- Vatakencherry, P.A and V.S.Bhat.Hindustan Lever Research center, Bombay
- Kalbag,S.S and Bhandarkar, Hindustan Lever Research center ,Bombay.
- Rao, V.R.V.V.R.Subrahmanyam and J.G.Kane, *J,oil Technol, Assn.of India*,5,57,1973
- Bhat, V.S.P.A, Vatakencherry and B.C.Subba Rao Hindustan Lever Research centre, Bomby.
- Prabhakar Rao,D,Ph.D.thesis, Bombay University, 1985.
- Private communication from unichema, Bromborough.
- Thakur, M.S.and B.P..Godrej, Godrej soaps Pvt.Ltd<Bombay Ind.Pat.No.11678, 1968
- Bhat S.G.and B.P.Baliga, symposium proceedings on producation and utilisation of forest products. Regional Research Lab, Jammu, 1979.
- Limye.D.B.Abstract of Proceedings of Indiuan Science congress 118,1925,151,1926
- Beal, G.D and M.C.T .Katti,J.Am.Pharm Ass., 14,1086,1926
- Manjunath, B.L.A.Seetharamiah and S>Siddapa, *chem,Ber*, 72.93.97,1939.
- Row, L.R,and T.R. Seshadri, *Proc.Ind.Acad.Sci*,33A, 168,1951.
- Seshadri, T.R and V.Venkateshwarlu, *Proc. Indi. Acad. Sci.*, 13A 414, 1941.
- Aneja, R., Mukerjee and T.R.Seshadri, *Tetrahedron* 2, 203, 1958.
- Raizada, K.S.P.S.Sarin and T.R.Seshadri, *j.Sci & Ind. Res*, 19B, 76,1960
- Rangaswami, S and T.R.Seshardri, *Curr.Sci*, 2,179,1940
- Narayanaswami, S.S.Rangaswami and T.R.Seschadri, *j.Chem.Sec*, 1871, 1954.
- Mukerjee. S.K and T.R.Seshadri, *j.Chem.Soc*, 163.1963.
- Row ,I.R, *Ayst,j,Sci, Res*, 45,2157, 1952
- Khanna R.N and T.R.Seshadri, *Tetrahedron*, 19,219,1963.
- Naiksatam,P.G, and N.V Bringi, *Ind,J,Chem,II*,209,1973.
- Naiksatam P.G, and N.V.Bringi, *Ind, j, chem*, 11,1188,1973
- Mukerjee, S.K,S.C.Sarkar and T.R.Seshadri, *Indi, j, chem*, 10,374,1972.
- Rey,D,N.n.Sharma and R.Nkhanna, *Ind, j,, chem*, 158,1138,1977.
- Rey, D and R.N.Khanna , *ind, j, chem*, 17B,525,1979.
- Pathak, V.P., T.R.Saini and R.N.Khanna, *phytochemistry* 22(1), 308,1983
- Rao, N.V.S and J.V.Rao, *Proc, Inc, Acad.Sci.*, 14B,123,1941.
- Sampath Kumar, P.S.v.V.S.murti and T.R.Seshadri, *Tetra hedron letters*, 4451,1971.
- Malik, S.B,T.R ,Seshadri and P.Sharma, *Int,j,chem*,15B,536,1977.
- Lekshmi,P.G.Srimannatayan and N.V.Subba Rao, *Ind,j,chem*,12B,8,1974
- Rangaswami ,S.J.V.Rao and T.R.Seshadri, *Proc.Ind.Acad.Sci*.16A,319,1952.
- Mittal, O.P.and T.R.Seshadri, *J.Chem.Sec*.217.1956.
- Mukerjee, S.K.S>C.Sarkar and T.R.Seshadri, *Ind.j.Chem*,7(12), 1275, 1969
- Mukerjee, S.K.S.C.Sarkar and T.R.Seshadri, *Tetrahedron*, 25,1063,1969
- Garg,G.P,N.N.Sharma and R.N.Khanna,*Ind.j.Chem*,16,658, 1978.

- Subramanyam,K.J.Madhusudhana, Rao and K.V.Jaganadha, Rao, *Curr, Sci*,42,129,1973.

- Subramanyam, K.J. Madhusudhana Rao and K.V. Jagandha Rao, *Ind. J. Chem.*, 15B, 12, 1977.
- Mahey, S.P. Sharma, S.K. Mukerjee and T.R. Seshadri, *Ind. J. Chem.*, 10, 585, 1972.
- Sharma, P.S.K. Mukerjee and T.R. Seshadri, *Ind. J. Chem.*, 11, 985, 1973
- Murti, P.B.R. and T.R. Seshadri, *Proc. Ind. Acad. Sci.*, 20A, 279, 1944
- Pankajamani, K.S. Ph.D. thesis, Delhi university, 35, 1953.
- N.V. Brindi and S.K. Mukerjee
- Garg, G.P.R.N. and R.N. Khanna, *International. J. Crude Drug (Holland)* 21, 43, 1983
- Pathak, V.P.T.R. Saini and R.N. Khanna, *Plant Medica*, 49(1), 61, 1983
- Rangaswami S and T.R. Seshadri, *Ind. J. Pharm.*, 3, 3, 1941.
- Osmani, Z.H. and M.B. Naidu, *Sci. cult.*, 22, 235, 1956
- Parmar, B.S. and K. Cgulati, *Ind. J. Ent.*, 31, 239, 1969
- Singh, U.V. Ph.D. Thesis. Post-graduate school, IARI, New Delhi, 1966
- Mishra, S.D. and S.K. Prasad, *Ind. J. Ent.*, 35, 104, 1973
- Singh, R.S. *Plant protection bulletin (FAO)*, 13, 35, 1965
- Bhat, S.G. Kane and A. Srinivasan, *Ind. Oilseeds. j.* 1, 298, 1957
- Patel, R.P. and B.M. Trivedi, *Ind. J. Med. Res.*, 50, 218, 1962
- Jambotrar, D.K., J.G. Kane and M.L. Khorana, *Ind. J. Pharm.*, 24, 154, 1962
- Ramaswami, A.S. and M. Sirsi, *Ind. J. Pharm.*, 22, 34, 1960
- Ann. Report Regional Research Laboratory, (CSIR), Hyderabad, 33, 228, 1966-67
- Parmar, B.S. Ph.D. Thesis, Post –Graduate school, New Delhi, 1969
- Parmar, B.S. Attri, R.P. Singh and S.K. Mukerjee, *Pesticides* 9, 29, 1975
- Parmar, B.S. Post, 12, 121, 1974
- Attri, B.S. S.C. Gupta. S.K. Mukerjee. B.S. Parmar and R.P. Singh. *Pyr. Post*, 12, 87, 1973
- Yashwani. I.D. Ved and P.G. Panse, *J. Agric. Sci.*, 33, 820, 1933
- Pal, C.B. and S.C. Rakshit, *Proc. Nat. Inst. Sci. (India)*, 33, 213, 1937
- Khan, A. *J. Sci. Club (India)*, 55, 235, 1952.
- Naik, B.N., N.N. Badhe and D.K. Ballal. *The Boona Agr. colledge, Magazine*, 51, 27, 1961
- Prakash, O. T.K. Sharma and A.J. Khan, *Proc. Indst. Chem. India*, 25, 31, 1953
- Sahrawat, K.L. B.S. Parmar and S.K. Mukerjee, *Ind. J. Agric. Sci.* 44. 415, 1974
- Sahrawat, K.L. and S.K. Mukerjee. *Plant and soil*, 47, 27, 1977.

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