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Pioneer in exotic butters

India's Manorama Industries supplies speciality fats sourced from tree-borne butter seeds, such as sal and kokum, to leading confectionery and cosmetics brands worldwide

Serena Lim

It might be surprising for consumers buying a skin cream from L'Oréal or a chocolate from Ferrero Rocher to discover that a key ingredient in them may have been supplied by a little-known company in the central Indian state of Chhattisgarh.

That company – Manorama Industries – supplies cocoa butter alternatives or speciality fats to some of the biggest players in the confectionery, chocolate and cosmetic markets.

"We are the only company in the world that sources sal, mango kernel, mowrah and kokum seeds, plus shea nuts from West Africa, and exports exotic speciality fats and shea- and sal- based cocoa butter equivalents," says president Ashish Saraf.

The exotic butter seeds are picked from trees or collected from forest floors by the firm's network of tribal communities.

"Manorama pioneered the use of seeds extracted from the fruits lying on the forest floor, which otherwise would have become forest waste," says chairman K N Agrawal.

"We have millions of tribal people – the majority of them women – spread across various states like Chhattisgarh, Jharkhand, Madhya Pradesh and Odisha collecting seeds," adds Saraf.

While the raw materials that Manorama sources come mostly from the forests across five Indian states, the company's speciality fats find their way to countries worldwide including Australia, China, Denmark, France, Germany, Italy, Indonesia, Japan, Malaysia, the Netherlands, Russia, Saudi Arabia, Singapore, the UK and the USA.

Among its list of customers are Italy's Ferrero and Unigra; France's Olvea



Manorama has a network of mostly women collecting tree-borne butter seeds from forest floors spread across various Indian states
Photo: Manorama Industries

Vegetables Oils; Germany's Walter Rau; Japan's Fuji Oil, Adeka Corp and Mitsui, and Mondelez International. It also supplies cosmetics companies including the Body Shop, L'Oréal, ActivOn, Naturasante LeafMotiv, Gustav Hess, Hallstar, Jedward International, Stearinerie Dubois, FILS and the Kerfoot Group.

Exports account for around 43% of Manorama's sales and increased by 58.45% in the company's 2019/20 financial year.

Along with Indian tree-borne butter seeds, Manorama also sources palm kernel oil (PKO) and palm mid fractions (PMF) from Malaysia, and shea nuts from West Africa, through Manorama Africa Ltd (MAL). Located in Tema, Ghana, MAL procures shea nuts in Ghana and also purchases shea nuts from Benin, Burkina Faso, the Ivory Coast, Mali and Togo. In addition, Manorama plans to set up shea processing facilities in Africa to process larger volumes of shea nuts and to make its African operations a 100% subsidiary.

Cocoa butter alternatives

According to Manorama's 2019/20 annual report, worldwide consumption of chocolates is growing and global market leaders include Ferrero, Hershey, Lindt & Sprüngli, Mars, Mondelēz and Nestlé.

Europe is the largest regional consumer with 11kg/capita of annual consumption.

Cocoa butter accounts for around 20% of chocolate by volume but 80% of the value, Manorama says. "If 5% of cocoa butter is replaced by a cheaper equivalent, raw material costs will reduce significantly by 6-8%. This would result in a massive cost saving for chocolate manufacturers."

This is why speciality fats or cocoa butter alternatives, which cost around half the price of cocoa butter, are used in an extensive range of bakery, chocolate, confectionery and ice cream products.

Manorama says the speciality fats and butter market is expected to set a CAGR of 6.6% (2018–2026) to reach a market value of US\$142.1bn by 2026, with high growth expected in the Asia-Pacific region. India is also one of the most important CBE markets, with a likely projected consumption of nearly 20,000 tonnes by 2022.

"The Indian chocolate market has seen a gradual shift in consumer preference from traditional Indian sweets to contemporary substitutes, of which chocolates are a prominent one. Six of the top 10 global chocolate manufacturers have already entered the Indian chocolate market," Manorama says in its annual report. "Moulded chocolates continue to be the favourite due to their rich taste and ease of availability in neighbourhood kirana shops and convenience stores."

"The increasing tradition of chocolate

gifting and the fear of adulteration in traditional sweets is also expected to be a major driver for the speciality fats industry."

India approved the 5% use of cocoa butter equivalents based on sal, mango and kokum in chocolate in January 2018 and Manorama says it is confident that the government will increase this 5% limit, spurring further industry growth.

Unique chemical composition

Cocoa butter has unique chemical and physical properties which endow chocolates with special edible qualities. It remains hard and brittle at 30°C and yet melts fully at 35°C. This rapid transformation is due to cocoa butter's unique chemical composition, which contains a high proportion of saturated fats, as well as monounsaturated oleic acid. Cocoa butter comprises about 80% symmetrical triglycerides. These are palmitic-oleic-palmitic (POP); palmitic-oleic-stearic (POS); and stearic-oleic-stearic (SOS) triglycerides.

However, as well as its high cost, cocoa butter also has a low milk fat tolerance, lacks stability at elevated temperatures and has a tendency to bloom due to improper storage or age, giving chocolate a whitish appearance on the surface.

Cocoa butter alternatives can improve the physical properties of the fat fraction in chocolate. There are three types of cocoa butter alternatives or speciality fats – cocoa butter equivalents (CBEs), cocoa butter substitutes (CBSs) and cocoa butter replacers (CBRs).

Cocoa Butter Equivalents (CBEs) are Manorama's core product. CBEs behave like cocoa butter in all respects and are able to mix with cocoa butter in any proportion without altering the melting rheological and processing characteristics of cocoa butter. The principle advantages of incorporating CBEs are the reduction in production costs as CBEs are cheaper than cocoa butter. CBEs also offer improved milk fat tolerance and improved stability of chocolates in tropical climates.

Cocoa Butter Substitutes (CBSs) are produced by static dry fractionation and total hydrogenation of good-quality palm kernel stearine. They are a non-tempering fat with a very sharp melt profile and a high heat cycling stability, melting at around 34°C with low viscosity in the molten state. Due to the high solid fat content, CBSs have excellent snap, brittleness and good flavour release. They are a choice ingredient for manufacturing moulded chocolates which require tempering. In addition, CBSs are preferred

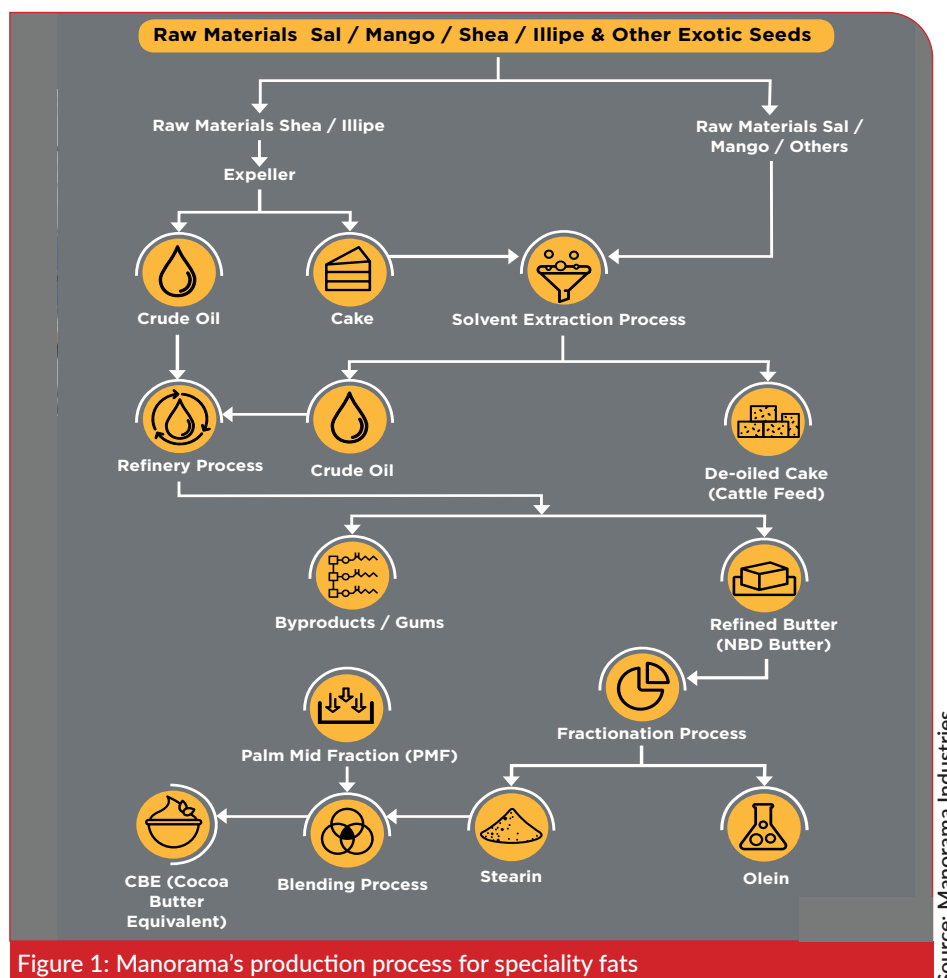


Figure 1: Manorama's production process for speciality fats

in tropical and subtropical countries due to their better heat stability compared to pure chocolate.

Cocoa Butter Replacers (CBRs) are a confectionery fat formulated from fractionated vegetable fats. They can be used to impart gloss retention and a sharp meltdown to the final product without tempering, and have a high tolerance (up to 20%) for cocoa butter. A CBR can be mixed with cocoa liquor to produce a compound chocolate. CBRs are mainly used in compound coatings and can be used in combination with cocoa butter to product compounds suitable for both coatings and moulding.

Cocoa Butter Improvers (CBIs) or Extenders can be formulated from Indian exotic fats to resemble cocoa butter in both physical and chemical properties and are used to increase the hardness of chocolate. They are compatible with cocoa butter and share a similar crystallisation and melt profile. CBIs can be used as a replacement for cocoa butter at any ratio, with added heat resistance and melting characteristics. They can be used to increase the heat-resistant properties of cocoa and chocolate.

Filling fats can be made from lauric and non-lauric sources and are produced by fractionation and hydrogenation.

Filling fats melt in the mouth at body temperature, which helps enhance the creamy flavour of confectionery items.

That is why they are often added as a filling in cookies, wafers, chocolates, bakeable fillings, spreads and dressings.

Expanding capacity

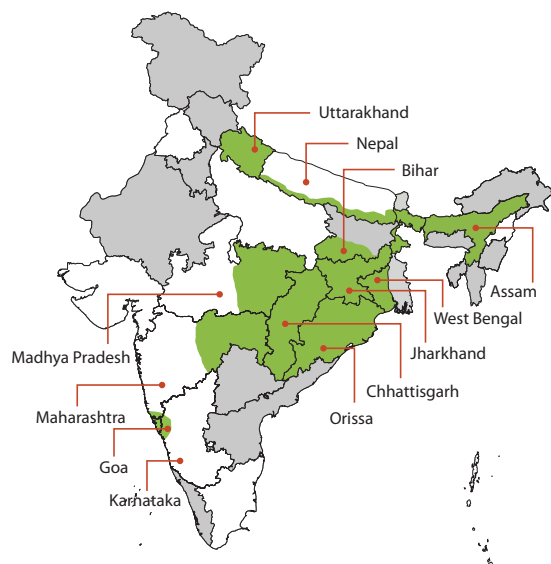
Manorama manufactures its speciality fats at its plant in Birkoni, near Raipur, Chhattisgarh, close to its sourcing centres.

It has expanded production capacity with the setting up of a fully integrated plant that incorporates crushing, extraction, refining, fractionation, interesterification and blending.

The company now has annual capacities of 15,000 tonnes in refining, 15,000 tonnes in fractionation, 15,000 tonnes in interesterification, 15,000 tonnes in deodorisation, 30,000 tonnes for packing and blending, and 60,000 tonnes for seed milling. A second phase solvent extraction plant has also been proposed for 2021.

"The key process of fractionation commercially started in March 2020. With this achievement, we expect to achieve optimum production levels in 2020/21."

Source: Manorama Industries



► Raw material supply

Manorama sources its raw materials mainly from the central and western areas of India (see map, above).

Sal butter



Photo: Manorama Industries

The sal tree (*Shorea robusta*) grows in the evergreen regions of central India, which has the largest sal forests in the world. Sal forests occupy around 116,000km² or 14% of India's total forest area.

The sal fruit contains seeds which have around a 14%-15% butter content. The collectable potential amount of sal butter is about 125,000-150,000 tonnes/year.

Sal fat is greenish brown in colour and its typical fatty acid composition is C16 (4%), C18 (47%), C18:2 (0.5%) and C20 (2.8%). A 2-stage acetone fractionation process gives a sal mid-fraction (45% yield).

Sal fat is used as a CBE and CBI in confectionery, and in products such as cosmetics, coatings and fillings.

Sal stearine is fractionated from sal fat and be used as a CBE and CBR. It is harder than cocoa butter and is used in the manufacture of plain chocolates.

Sal oleine is liquid at room temperature and effective as an emollient, finding use in skincare products and other cosmetics. It can be interesterified with hard fat to produce a zero *trans* fat for ice-creams, bakery products and hydrogenated vanaspati.

Mango butter or mango kernel fat



Photo: Adobe Stock

Mango butter or mango kernel fat is obtained from the seed kernels of mangoes, a seasonal fruit available from June-July. At 5M tonnes/years, India is one of the world's largest mango-producing countries and the potential availability of mango kernels is around 500,000 tonnes, which can yield about 40,000 tonnes of mango kernel fat.

Manorama collects mango kernels through its supplier network across states including Chhattisgarh, Madhya Pradesh and Odisha but is looking at sourcing the kernel from the Indian pulp industry, where mango seeds are considered a waste product.

The mango seed has a white kernel, which contains 7-11% of greyish-white fat. The fat is solid, closely resembling cocoa butter in physical and chemical characteristics, and is therefore used as a CBE or cocoa butter extender. Refined mango butter is suitable as a confectionery fat and in cosmetic formulations.

The major fatty acids in mango fat are oleic (33-53%) and stearic (24-49%) but the fatty acid composition varies considerably due to the wide variety of mangoes grown in India.

Mango stearine is produced by solvent or dry fractionation of mango butter and is mainly used in CBEs and CBRs.

Mango olein is also produced by solvent or dry fractionation of mango butter and is mainly used by the cosmetics industry.

Kokum/Dhupa butter



Photo: Manorama Industries

The kokum (*Garcinia Indica*) or dhupa tree is found in the evergreen forests of India's Western Ghats mountain range.

The lemon-sized dark purple fruits are beaten with sticks to separate the rind from the seeds, which account for 20-23% of the fruit's weight. On average, a tree yields 60-80kg of seeds.

The yield of kokum butter from kokum seed kernels is about 32-35%.

The fat is produced from the seeds after crushing in a solvent extraction plant. Refined fat is obtained after conventional chemical refining.

Kokum fat increases the hardness of chocolates and is used in various confectioneries. It is a very important component for fillings and is used as an alternative fat in cosmetics. It is also used in the manufacture of soap, cosmetics, candles and ointments. When mixed with mowrah stearine and palm mid fractions, kokum fat can be used to produce CBEs.

Kokum butter has a fatty acid composition of C16 (3.4%), C18 (67.4%), C18:1 (28.1%), C18:2 (0.6%) and C20 (0.3%). It has a very high symmetrical SOS content (83.4%), allowing direct blending with palm mid-fractions without fractionation for preparing CBEs.

Mowrah/Mahua butter



Photo: Adobe Stock

The mowrah or mahua (*Madhuca latifolia*) tree is commonly found in Central and South India and the monsoon forest of the Western Ghats mountain range.

The mahua fruit is rich in sugar (73% content) and can be used to manufacture jam or fermented to produce an alcoholic drink. The orange-brown berry contains one to four seeds, which can be separated from the fruit wall by pressing. Each seed contains two kernels, and the kernels contain about 50% butter.

The estimated potential of mowrah kernels is 1.11M tonnes, and the possible butter potential is 400,000 tonnes, assuming an average 36% yield.

Mahua seeds contain 35% butter, which is solid at ambient temperature. Depending on the application, the crude fat is refined in different ways. For CBS and cosmetic uses, the fat is refined by conventional chemical refining. For use in vanaspati, it is physically refined by an expelling process. Mowrah butter is used

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► for cooking, soap and candle making and to manufacture cosmetic creams.

Phulwara butter



Photo: Adobe Stock

The phulwara (*Aisandra butyracea*) tree is generally found on hill slopes and valleys in the sub Himalayan tract, such as in the states of Sikkim, Uttaranchal and northern parts of Bengal. The tree is also known locally as chiuri, kaeleb or butter nut.

The trees begin to bear fruit when they are five to nine years old, up to 50-60 years. Ripened fruits are collected by hand or by beating the plant with long bamboo sticks and the harvested fruits are dried in the shade for 8-12 days.

The seeds constitute 20% of the fruit and can be manually or mechanically separated. Seeds are cleaned and then dried, and have a thin coat (20% of the weight) which can be easily decorticated to give an 80% yield of white kernels.

The butter content of the kernels is 60%. Phulwara fat is light yellow to white in colour. Refined phulwara butter is marketed as phulwara ghee.

The fatty acid composition of phulawara fat is C16 (60.8%), C18 (3.2%), C18:1 (30.9%) and C18:2 (4.9%). It is rich in palmitic acid and contains 62% symmetrical POP triglyceride. It is possible to obtain a POP-enriched fraction suitable for blending with SOS fractions to prepare a CBS.

Simaruba butter



Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

The simaruba (*Bursera simaruba*) tree is native to parts of Central and South America and has recently been cultivated in some areas of India.

Simaruba butter contains mainly palmitic (10-12.5%), stearic (25-27%) and oleic (55-59%) fatty acids.

The butter is used to manufacture vanaspati, vegetable butter and/or margarine. The refined, bleached and deodorised (RBD) butter is further fractionated to separate the liquid and solid fractions.

The liquid fraction with a very high oleic acid content (about 85%) is comparable to olive oil in its chemical composition.

The solid fraction is rich in stearic and palmitic acids and can be used as a CBS or cocoa butter extender in confectionery and bakery applications. The palmitic stearine fraction is also useful in the preparation of ice cream and mayonnaise.

Shea butter



Photo: Adobe Stock

The shea tree is spread over West Africa, chiefly in Benin, Burkina Faso, Central African Republic, Ghana, Mali, Senegal, Togo and Uganda.

Africa produces about 1.76M tonnes/year of raw shea nuts from its wild trees, mainly in the Savannah and Sahel regions, but producers harvest and process only about 35% (about 600,000 tonnes) for export as butter or nuts.

The fresh nut contains 43-68% moisture by weight and as much as 30-45% of the kernel can be recovered.

Shea butter has a high proportion of unsaponifiable matter and, unlike cocoa butter, contains a high proportion of di- and tri-unsaturated glycerides, which give it a softer consistency.

The unsaponifiable fraction makes shea butter a widely used ingredient in cosmetics as a moisturiser or lotion.

Shea butter is also edible and its stearine fraction can be used in conjunction with other vegetable fat fractions to produce an ingredient with a chemical composition almost identical to that of cocoa butter. The olein fraction is used for margarine and baking.

Palm kernel oil

The oil palm produces crude palm oil (CPO) from its fibrous mesocarp and crude palm kernel oil (PKO) from



Photo: Adobe Stock

its kernels. CPO is chemically and nutritionally different from PKO. Refined, bleached and deodorised (RBD) palm oil is a popular cooking oil.

The palm mid fraction (PMF) or palm stearine is the more solid fraction obtained by fractionation of palm oil after crystallisation and is a co-product of palm olein. PMF is the major ingredient for CBE and CBS manufacturing and is a very useful fully natural hard fat component for products such as shortenings, pastries and bakery margarines.

PKO, palm kernel olein and palm kernel stearine find applications in margarine, confectioneries, coffee whiteners, biscuit creams and coating fats – with little or no further processing required.

Going for growth

Manorama has grown from a small company to making its first listing on BSE Ltd (the former Bombay Stock Exchange) in October 2018, raising Rs64 crore (US\$8.5M).

It reported Rs49.8 crore (US\$6.65M) in EBIDTA in 2019/20 compared with Rs31.92 crores (US\$4.26M) in 2018/19, and revenue of Rs188.24 (US\$25.1M) in 2019/20 against Rs102.4 (US\$13.7M) the previous year.

"We expect to achieve optimum production levels in 2020/21 and further progress our ambition to become one of the leading Indian manufacturers in the global CBE and speciality butter and fats market," the company says in its annual report.

Executive director Kedarnath Agarwal adds that the COVID-19 pandemic and resulting economic slowdown have created an unprecedented challenge for the company and businesses around the world.

"It is difficult at this stage to assess the exact impact of COVID-19 on our performance for the whole of 2020/21. However, we see strong and encouraging upward direction in our user markets and we remain cautiously optimistic."

Serena Lim is the editor of OFI. Information on cocoa butter alternatives and tree-borne butters has been supplied by Manorama Industries