SHEA BUTTER

A valuable African ingredient
Shea butter is an African fat which is a suitable ingredient for many cosmetic products, like body butters and skin care products. The unique unsaponifiable fraction in shea butter adds a lot of benefits as it has interesting biological activities. The use of shea butter also enables contributing to an increase in the living standards of women in Western African countries, by working together with women’s corporations in a sustainable way.

**Nomenclature and botany**
In the local languages, ‘shea’ is called karité (in Wolof), karé, karey, karedé, kolo (in Peuhl), and sé, si, sii (in Bambara). In French, shea butter is called beurre de karité.

For the botanical name *Butyrospermum parkii*, also *Butyrospermum paradoxum* or *Vitellaria paradoxa* is used. The tree can reach up to ca. 15 m in height, but in protected areas, higher trees can be found. The nuts contain around 30 – 54 % of shea butter.

**Geography, economics and ecosystems**
The shea butter is derived from the shea tree, which is native to the semi-arid savanna, South of the Sahara, and grows in the wild. This savanna belt where the shea tree grows, is ca. 5000 km long, and stretches out from Western Africa (involving countries such as Burkina Faso and the north of Ghana), and extends to the East. The tree plays a very important role in people’s lives. It is part of the diet of local people, but it serves also as an income for many people, typically women. In certain Western African countries, revenues due to shea accounts for an important part of the total women’s revenues, sometimes up to ca. 100 %.
The living standards in the key producing countries are typically not high, so the importance of the shea economy can be seen in the framework of raising the quality of life in general, but it can also be an interesting development from a viewpoint of a more balanced gender equality. Due to its importance, shea trees are actively managed and protected already since a very long time.

**Traditional and local usage**

The importance of the shea tree is also reflected in the wide variety of traditional and local uses. The several plant parts, such as the flowers, fruits, nuts and foliage, serve a large range of useful functions, as well as (extracts of) the bark and the roots. Of course, the butter has a long established track record. It has been said that the use of shea butter goes back to Cleopatra’s Egypt (Nahm 2011). In Nigerian traditional medicine for instance, the butter is used as an emollient in case of a range of illnesses (Tella 1979). A very illustrative example is the use against nasal congestion, in line with local traditional healers. In a test, the nasal congestion was relieved better with shea butter than with xylometazoline (Tella 1979).

**Culinary use**

No surprise, shea butter has been used extensively locally as an important cooking oil. In Europe for instance, shea butter (or actually the stearin-rich fraction of shea butter) is used in chocolate products. The fact that it is consumed on a large scale, also contributes to the confidence in shea butter from a safety point of view.

**Composition**

As with most oils and butters, the greatest part of the product consists of triglycerides, rich in – in the case of shea butter – stearic and oleic acid. A typical fatty acid profile is given in the Table. The fatty acid composition, and also the way the fatty acids are arranged over the three positions on the glycerol (i.e. the triacylglycerol profile) determines many properties of shea butter, like its melting point and crystallisation behaviour. The most important triacylglycerols are SOS (stearic-oleic-stearic), SOO and OOO (Akihisa et al 2011).

<table>
<thead>
<tr>
<th>Fatty Acid</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palmitic acid (C16:0)</td>
<td>ca. 4%</td>
</tr>
<tr>
<td>Stearic acid (C18:0)</td>
<td>ca. 43%</td>
</tr>
<tr>
<td>Oleic acid (C18:1)</td>
<td>ca. 44%</td>
</tr>
<tr>
<td>Linoleic acid (C18:2)</td>
<td>ca. 6%</td>
</tr>
<tr>
<td>Eicosanoic acid (C20:0)</td>
<td>ca. 1.5%</td>
</tr>
<tr>
<td>Eicosenoic acid (C20:1)</td>
<td>ca. 0.3%</td>
</tr>
</tbody>
</table>

**Figure 1** UV absorbance spectrum of a random batch. Maximum specific absorbance depends on the batch, but will be around ca. 10 – 20.

**Figure 2** Rough indication of shea tree occurrences.
Regulatory information

<table>
<thead>
<tr>
<th>INCI EU / CosIng name:</th>
<th>Butyrospermum Parkii Butter</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCI US name:</td>
<td>Butyrospermum Parkii (Shea) Butter</td>
</tr>
<tr>
<td>CAS no:</td>
<td>194043-92-0 / 91080-23-8</td>
</tr>
<tr>
<td>EINECS no:</td>
<td>293-515-7</td>
</tr>
<tr>
<td>Japan - cosmetics:</td>
<td>No restrictions known.</td>
</tr>
<tr>
<td>Canada:</td>
<td>DSL listed (e.g. CAS no 91080-23-8 and 194043-92-0). Ingredient not found on Cosmetics Hotlist (list of prohibited and restricted cosmetic ingredients, status 2014).</td>
</tr>
<tr>
<td>China listing:</td>
<td>IECSC listed (e.g. CAS no 194043-92-0). Listed in Inventory of Existing Cosmetics Ingredients China (IECIC), Final 2014 version. Chinese name: 牛油果霜 (Butyrospermum Parkii) 果脂</td>
</tr>
</tbody>
</table>

The most interesting fraction is its unsaponifiable fraction, usually present in a 4 – 8 % concentration in shea butter, which consists for an important part of triterpene alcohols, which bears resemblance to sterols.

The triterpenes are identified as alpha-amyrin, beta-amyrin, lupeol and butyrospermol, most of which present as acetate or cinnamyl ester. The most prominent triterpene esters are alpha-amyrin cinnamate, butyrospermol cinnamate, alpha-amyrin acetate and lupeol cinnamate (Akihisa et al 2011). The fatty acid profile, the level of high melting triacylglycerols and the level of triterpene alcohols is dependent on the geographical region within the savanna belt, which makes especially Western Africa a useful geographical origin for shea butter.

Our quality

Our Shea Butter answers to the strict demands of the cosmetic industry. It is refined to have e.g. a low colour, a low acidity, and a low odour, while retaining the valuable characteristics of shea butter. Furthermore, the product falls within our strict quality system, ensuring a high quality which deserves the trust and confidence of customers.

Efficacy

In a study using 30 volunteers, shea butter was applied daily for several months, leading to a smoother, clearer skin. In half of the volunteers, skin wrinkles were visually diminished. A skin regeneration effect was observed. In another study, 49 volunteers applied twice daily a formulation with pure or 15 % shea butter. In 75 % of the volunteers, a reduction in wrinkles and an improvement of skin suppleness was seen, as described in a review (Sousselier 2000).
Shea butter is known for its effects on the skin under the influence of UV light. Shea butter absorbs some UV light, and, in addition, it imparts anti-inflammatory actions. In a test with guinea pigs, 0.4 ml shea butter is applied on a skin surface of 10 cm², after which the animals were irradiated with UV light. The erythema is scored after 5 and 24 hours. In comparison to the (untreated) reference, an inhibition of 81 % after 5 hours and 95 % after 24 hours is calculated. This inhibition is not ascribed to the UV absorbing properties, but to the anti-inflammatory action of shea butter on the skin (Eggensperger 1995).

Apart from the test involving nasal congestion, shea butter also showed a boosting effect when used together with other anti-inflammatory compounds. Shea butter improved the anti-inflammatory effect when used together with an extract of Khaya senegalensis barks. In this test, the inhibition of the croton oil ear oedema increased from a 52 or 58 % inhibition when it was tested in vaseline or lanolin, to a 75 % inhibition when tested in shea butter (Thioune et al 2000).

The effect of the different triterpene esters on effects related to inflammation and tumor promotion has been the subject of careful study. Alpha-amyrin, beta-amyrin, lupeol and butyrospermol acetate and cinnamates, isolated from shea butter, inhibited 12-O-tetradecanoylphorbol-13-acetate (TPA)-induced inflammation in mouse ear, especially lupeol cinnamate. Furthermore, moderate inhibitory effects on Epstein-Barr virus early antigen (which is a screening test for tumor promoter inhibition) was seen. Lupeol cinnamate showed inhibitory effect in a 7,12-dimethylbenz[a]anthracene (DMBA) initiated / TPA-promoted carcinogenesis test (Akihisa et al 2010).

In another study (Verma et al 2012) it is found that in a test system, an extract of shea butter reduced levels of lipopolysaccharide-induced nitric oxide, TNF-alpha, IL-1beta and IL-12 and inhibited expression of pro-inflammatory enzymes, which gives insight in the molecular basis of the anti-inflammatory action of shea butter.

Shea Butter is a valuable ingredient in cosmetics. Due to its unique composition and its anti-inflammatory effects, the product offers much more than emolliency alone.
Safety
It should be noted that shea butter is known as edible fat in Europe. Some investigations to confirm the safety of shea butter are described in the literature.

Shea oleine (a liquid fraction obtained from shea butter) did not show reproduction toxicity at 7.5 g/kg/day in the rat (Baldrick et al. 2001), nor did shea butter (or oleine) produce any signs of adverse toxicity or carcinogenic potential over 104 weeks when fat at 15 % to rats (Carthew et al. 2001). In a randomized strictly controlled metabolic feeding study, a shea butter diet favourably changed blood lipids and factor VII coagulant activity, compared to both a diet with palm oil or palm-kernel oil with high-oleic sunflower oil (Tholstrup et al. 1994).

Skin tolerance is tested in human volunteers, as described in reports from 2010. An eye cream containing 4 % shea butter did not induce irritation, and repeated applications did not induce allergic reactions in 108 volunteers. Same results were obtained with a face cream with 4 % shea butter in 51 subjects (CIR 2010).

Applications
The characteristics of shea butter makes it a useful ingredient in a broad range of products. Not only the anti-inflammatory characteristics are useful in e.g. shaving creams or (after) sun care products, also the fact that this is a butter which melts at body temperature provides a broad range of opportunities. Examples are skin creams, body butters and stick products.

Socio-sustainable sourcing
Historically, shea nut handling has been important for rural women to provide for their families and contribute to their communities. The local collection of shea nuts, and the manufacture of shea butter from these nuts, can give important opportunities to women in Western Africa. IMCD Benelux had experience with such way of socio-sustainable sourcing involving a fair pricing system in order to increase revenues for local women involved.
A recent example of such a fair price system is a cooperation of IMCD with a network in northern Ghana, called Star Shea. In this region of Ghana, considered as the poorest of the country, a network of rural women groups is set up enabling women to increase their revenues from shea nut collection and the local manufacture of shea butter.

In this network, high-quality shea products are directly offered to buyers further down the supply chain, at fair market prices. In this way, women can increase their income, thereby gaining financial independence, in comparison to the situation in which they would offer shea nuts under less favourable commercial conditions.

Women groups are provided with trainings not only on e.g. shea harvesting and nut selection, but also with business trainings. Furthermore, microcredit, software solutions, mobile phone technology and support with product commercialisation is offered. Over 200 women groups are part of the network, which will soon expected to comprise approx. 9000 women. The shea butter obtained via this network is sold as a separate grade.

REFERENCES


Nahm H.S. (2011): Quality characteristics of west african shea butter (Vitellaria paradoxa) and approaches to extend shelf-life. Thesis, Rutgers, The State University of New Jersey.


Shea butter portfolio

A selection of our portfolio is given below:

<table>
<thead>
<tr>
<th>Shea Butter RBD</th>
<th>Refined shea butter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Star Shea Butter Refined</td>
<td>Refined shea butter, originating from the StarShea network.</td>
</tr>
</tbody>
</table>

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