

# Shea Butter Scientific Information

Shea butter is the fat extracted from the kernels of *Vitellaria paradoxa* Gaertner (Sapotaceae), which is also known as *Butyrospermum parkii*. The species is found across 19 countries across the African savanna zone from Senegal to Ethiopia. Shea butter contains high levels of UV-B absorbing triterpene esters, including cinnamic acid, tocopherols (vitamin A), and phytosterols. Shea butter does contain a high percentage of unsaponifiables, such as phytosterols (campesterol, stigmasterol, beta-sitosterol, and alpha-spinosterol) and triterpenes (cinnamic acid esters, alpha- and beta-amyrin, parkeol, buytospermol, and lupeol), and hydrocarbons such as karitene (1, 2)

## Shea Butter Fatty Acid Profiles

Shea butter is composed of five principal fatty acids: palmitic, stearic, oleic, linoleic, and arachidic (Table 1) (3). The fatty acid composition is dominated by stearic and oleic acids, which together account for 85-90% of the fatty acids (3). The relative proportions of these two fatty acids produces differences in shea butter consistency. The high stearic acid content gives the shea butter its solid consistency, while the percentage of oleic acid influences how soft or hard the shea butter is.

The proportions of stearic and oleic acids in the shea kernels and butter differ across the distribution range of the species. Ugandan shea butter has consistently high oleic acid content, and is liquid at warm ambient temperatures. Ugandan shea butter fractionizes into liquid and solid phases, and is the source of liquid shea oil. The fatty acid proportion of West African shea butter is much more variable than Ugandan shea butter; the oleic content ranges from 37 to 55%. Variability can even be high in relatively small local populations; a tree that produces hard butter can be located right next to one that produces soft butter. Nuts are gathered from a wide area for local production, so shea butter consistency is determined by the average fatty acid profile of the population. Within West Africa, shea butter from the Mossi plateau region of Burkina Faso has higher average stearic acid content, and was found to be harder than shea butter from other West African regions (3).

Table 1. Fatty acid variation in shea butter (3)				
Fatty acid		Percentage of total fatty acids		
		Mean	Min	Max
16:0	Palmitic	4.0	2.6	8.4
18:0	Stearic	41.5	25.6	50.2
18:1	Oleic	46.4	37.1	62.1
18:2	Linoleic	6.6	0.6	10.8
20:0	Arachidic	1.3	0.0	3.5

Fatty acid carbon chain length:number of double bonds  
N.B. Data are from 432 trees samples in 42 populations in 10 countries (3)

## Shea Butter Phenolics

Phenolic compounds are known to have antioxidant properties. A recent study characterized and quantified the most important phenolic compounds in shea butter (4). This study identified 10 phenolic compounds in shea butter, eight of which are catechins, a family of compounds being studied for their antioxidant properties. The phenolic profile is similar to that of green tea, and the total phenolic content of shea butter is comparable to virgin olive oil. Also, this study was performed on shea butter that had been extracted with

hexane, and the authors note that alternative extraction methods - such as traditional extraction - may result in higher phenolic levels. Furthermore, they note that the catechin content alone of shea kernels is higher than the total phenolic content of ripe olives.

This study also found that the overall concentration and relative percentages of different phenolic content in shea kernels varied from region to region. The authors hypothesized that the overall concentration of phenols in shea kernels is linked to the level of environmental stress that the trees endure.

### Sources:

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2. Badifu, G.I.O. 1989. Lipid composition of Nigerian *Butyrospermum paradoxum* kernel. *J Food Compos Anal* 2:238-244.
3. Maranz, S, Z. Wiesman, J. Bisgaard and G. Bianchi. 2004. Germplasm resources of *Vitellaria paradoxa* based on variations in fat composition across the species distribution range. *Agroforestry Systems* 60:71-76.
4. Maranz, S., Z. Wiesman and N. Garti. 2003. Phenolic constituents of shea (*Vitellaria paradoxa*) kernels. *J Agric Food Chem* 51: 6268-6273.