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## **Cosmetic Potentials of African Shea Nut (*Vitellaria paradoxa*) Butter**

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### **ABSTRACT**

This study reviews the prospects of shea nut butter in the cosmetic industry. The impact of the use of shea nut butter for cosmetics to the economy of the African shea butter producing countries was exploited. This alternative use of the shea nut butter is also an evident of its usage as one of the possible ways of protecting the shea nut tree against destructive uses like cooking fuel.

**Key words:** Shea nut butter, cosmetics, non destructive uses and commercial production

### **INTRODUCTION**

Shea nut oil is produced from shea nuts derived from the Shea tree *Butyrospermum parkii*. The shea tree, formerly *Butyrospermum paradoxum*, is now called *Vitellaria paradoxa*.

Shea-butter tree is found in areas with 400-1800 mm rainfall per year. The species is of African origin (IPGRI, INIA, 2006). This tree is an indigenous tree species to many countries in Sub-Saharan Africa and in these countries the shea tree and its many uses have been known for over centuries (Carette *et al.*, 2009).

The shea tree grows naturally in the wild in the dry Savannah belt of West Africa from Senegal in the west to Sudan in the east and onto the foothills of the Ethiopian highlands. It occurs in 19 countries across the African continent, namely Benin, Ghana, Chad, Burkina Faso, Cameroon, Central African Republic, Ethiopia, Guinea Bissau, Cote De voire, Mali, Niger, Nigeria, Senegal, Sierra Leone, Sudan, Togo Uganda, Zaire and Guinea. In Ghana (FAO, 1988), it occurs extensively in the Guinea savannah and less abundantly in the Sudan Savannah. The shea tree occurs over almost the entire area of Northern Ghana, over about 77,670 square kilometers in Western Dagomba, Southern Mamprusi, Western Gonja, Lawra, Tumu, Wa and Nanumba with Eastern Gonja having the densest stands. There is sparse shea tree cover found in Brong-Ahafo, Ashanti and the Eastern and Volta regions in the south of the country (Fabil, 2010). The Shea nut tree is an economic crop indigenous to the Guinea and Sudan savanna zones of Nigeria. It is grown between latitudes 70-120 N. Its role in food production, foreign exchange earnings, raw materials for industries, income and employment generation to millions of Nigerians (Garba *et al.*, 2011). In Nigeria, the shea tree grows in the following states: Niger, Kwara, Kebbi, Kaduna and Oyo (Nigerian Export Promotion Council, nd). Sheabutter Fat (SBF), obtained from sheabutter seed, is readily available and cheap cooking ingredient the northern parts of the country where the tree grows virtually everywhere (Yusuf *et al.*, 2009). It constitutes an important source of fat in food and cosmetics (Okullo *et al.*, 2010). Its fatty matter has been used for years in Africa for different purposes, ranging from food and soap processing, to healthcare and other medicinal uses (Coulibaly *et al.*, 2009). Pousga *et al.* (2007) reported the evaluation of the nutritive value for chickens of some local by-products including Shea-Nut (*Vitellaria paradoxa*) Cake in Burkina Faso. Global interest in the product stems from its use as a cocoa butter equivalent in the

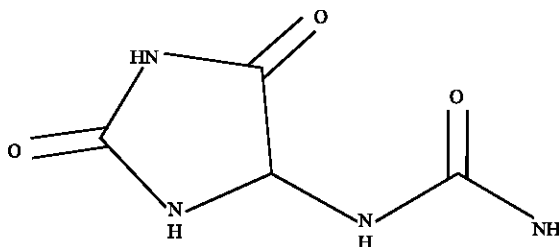


Fig. 1: Chemical structure of Allantoin, a healthy tissue growth stimulant present in shea butter

pharmaceutical and cosmetics industries (Elias *et al.*, 2006). It is also used to treat horses internally and externally for girth galls and other sores. The healing properties of shea butter are believed to be partly attributable to the presence of allantoin (Fig. 1), a substance known to stimulate the growth of healthy tissue in ulcerous wounds (Wallace-Bruce, 1995). The immense applications of *Vitellaria paradoxa* to the treatments of many bacterial diseases motivated the investigation of the plant for antibacterial components (Garba and Salihu, 2011). In general shea butter can be used in most oil based products or in the oil phase of cosmetics and toiletry formulations (Lovett *et al.*, 2005). Some physicochemical parameters of the shea nut fat were in favour of its utilization in soap making in comparison with other selected indigenous fats and oils (Warra *et al.*, 2009c). As a cosmetic, it is used as a moisturizer, for dressing hair (Dalziel, 1937; Ezema and Ogujiofor, 1992).

Currently, Shea is also being tested in new products such as dermatological creams for HIV patients to provide relief from skin rashes and irritations and veterinary products (Ferris *et al.*, 2001).

This review explored the potentials of African shea nut fat in the cosmetic industry with the view to encouraging the indigenous processing of the oil at improved commercial quantity and quality.

**Shea nut fat extraction:** Most shea butter products in Africa are manufactured manually and in general, without the use of chemicals or bleaching agents (Warra *et al.*, 2009a). This method is found to be cheaper and better method to extract shea butter. Warra (2009) reported a simple local method of extracting shea nut fat, process that has been practiced for many years by the native Gungawa tribe in Kebbi State, Nigeria which requires the followed nine steps:

- The nuts were Par-boiled to prepare them for shelling
- Drying and selection was done to remove the bad ones
- The nuts were crushed by grinding into powdery material
- The shea nut flour was then milled using milling machine
- The milled flour was mixed with cold and hot water to break the emulsion and to facilitate separation
- Separation of the fat was done using cold-water separation process causing the fat to float
- The shea fat was decanted leaving a brown residue devoid of oil which settles to the bottom
- The butter was dehydrated by boiling leaving it to settle under the pot
- The shea fat was purified by decanting the liquid fat which was then allowed to cool down and solidify

These steps can be compared relatively with the method reported by Khobe *et al.* (2009).

To avoid rancidity the shea butter sample is normally stored and transported in airtight plastic containers.

Mohagir *et al.* (2009) reported optimization of some pre-treatment involved in the press extraction of shea (*Vitellaria paradoxa* Gaertner F.) Butter. Coulibaly *et al.* (2009) reported an experimental study of shea butter extraction efficiency using a centrifugal process. Hexane extraction using soxhlet extractor can be employed (Nkouam *et al.*, 2007). Similar to the method adopted for the extraction of *Polyalthia longifolia* seed oil (Oyededeji *et al.*, 2011) and African Pear (*Dacryodes edulis*) fresh leaves (Onocha *et al.*, 2011).

**Background:** Research into the properties and potential industrial uses of shea butter began in the first few decades of the last century. Previously, it was used in edible fats and margarine, e.g., Oleine® and was only beginning to attract the soap and perfume industry when interest ceased because of the 2nd World War. Revival of the shea industry after the war suffered serious setbacks from an insufficient pricing mechanism, logistical problems of transport (low availability and unpredictable) unable to cope with the supply of the nuts, thus making the ventures economically non-viable. During the mid 1960s Shea trade re-emerged when Japanese traders joined their European counterparts which saw a considerable expansion of the industry, particularly in the cosmetics and confectionery industry barely a decade thereafter (Cocoa Research Institute of Ghana, 2007).

**Shea nut production in african producing countries:** Table 1 shows the statistics of shea nut production in Metric tonnes in the six African shea nut producers. Processing Shea nut into oil is an historical traditional for communities in African producing countries. This knowledge has been passed from generation to generation and is widely practiced in the shea belt. The process is however, time consuming, labour intensive and hard work taking a day to produce a sufficient amount for sales and home use. There are many variations around the main procedures, but essentially, the nuts are ground or pounded into rough grist, using mortars and grinding stones and then roasted. In some cases the nuts are roasted prior to grinding. After heating the nuts is ground into a paste. This paste is mixed with an equal amount of water and boiled. The oil is then skimmed off and held in a separate container. The oil is often rewashed and boiled to remove particles and mucilage from the first stage boiling. The oil is then left to cool, the product is usually a brown oil which separates into the olien and stearin fractions.

**Worldwide exports of african shea nut:** FAO export statistics of major supplying countries are provided in Table 2 and 3 although they are not considered to be completely accurate and are primarily estimates.

Table 1: Shea nut production, 1993-98 (MTs) (Ferris *et al.*, 2001)

Country	1994	1995	1996	1997	1998
Benin	15500	15000	15000	15000	15000
Burkina Faso	20100	75700	70000	70000	70000
Cote d'Ivoire	19785	20000	20000	20000	20000
Ghana	57000	56000	55000	55000	55000
Mali	85000	85000	85000	85000	85000
Nigeria	353000	384000	345000	355000	355000
Total	687385	611220	592504	606500	606500

Table 2: Worldwide shea nut exports by volume, 1993-97 (MTs) (Ferris *et al.*, 2001)

Country	HSCcode 129792				
	1993	1994	1995	1996	1997
Ghana	1793	13958	6000	19654	19654
Benin	7870	15266	9504	9504	9504
Cote d'Ivoire	4792	12163	11195	5422	5422
Burkina Faso	5000	5000	7633	7633	7633
Togo	1122	6562	4606	8330	5284
Nigeria	-	5000	-	-	-
Mali	5000	5000	5000	5000	5000
UK	-	215	182	28	-
Other	28	10	34	21	31
Total	21995	58704	39654	51992	48028

Table 3: Worldwide shea nut exports by value, 1993-97 (US 5000s) (Ferris *et al.*, 2001)

Country	HSCcode 129792				
	1993	1994	1995	1996	1997
Ghana	340	2590	1500	5846	5846
Benin	1071	2223	1400	1400	1400
Cote d'Ivoire	319	1601	1973	793	793
Burkina Faso	500	500	847	847	847
Togo	1122	6562	4606	8330	5284
Nigeria	-	5000	-	-	-
Mali	150	150	150	150	150
UK	-	45	37	9	-
Other	6	9	38	10	33
Total	3523	9382	6733	10329	10041

Table 4: Fatty acid profiles shea butter versus competitors (Ferris *et al.*, 2001)

Oil type	Iauric (12:0)	Myristic (14:0)	Palmitic (16:0)	Stearic (18:0)	Oleic (18:1)	Linoleic (18:2)	Linolenic (18:3)
Cocoa butter			25	35	30-40	2-4	
Olive			12	2	72	8	1
Palm oil (husk)			42	4	38	9	
Coconut	44	16	8	3	5	2	
Shea butter							
Literature	0-0.5	0-1.6	3-9	30-50	41-50	4-11	0-7.5
Uganda			6.5	26.4	59.3	6.2	0.2
Nigeria			3.2	38.9	47.5	6.5	0.2
Burkina Faso			12.1	42.5	39.3	4.5	0.2
Mali			19	31.1	42.6	5.7	0.2

Exports during the last two years of available statistics hovered around 50,000 MTs with an export value of around \$10 million. Exports in 1996 and 1997 are more than double the five year low recorded in 1993, but lower than the high recorded in 1994 (Ferris *et al.*, 2001).

**Chemical composition of the shea nut across africa:** Chemical analysis of Shea butter extracted from nuts samples from four African countries (Uganda, Nigeria, Burkina Faso and Mali) were conducted by the Ben Gurion University, Isreal, as part of the ongoing EU funded INCO

project on Shea. Fatty acid analysis shows there is a high level of variability in Shea oils across Africa (Table 4). The Ugandan sample had a 59% oleic acid content compared with 47% for Nigeria and only 39% for Burkina Faso (Ferris *et al.*, 2001). A detailed account of general physical properties and composition of fatty acids (%) of shea butter is also presented in Hall *et al.* (1996).

Summary of some cosmetic uses of African shea nut butter (Ferris *et al.*, 2001).

		Athletes and sportsmen cream lips and balms and lipsticks	
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Skin care	O.T.C. Pharmaceuticals	Sport	International and oral applications
Sun care and after sun products	Topical analgesics and anesthetics	Body butter	Oral ointments
Hand and body lotions (oil phases)	Hydrocortisone creams		
Shaving and depilatory preparation	First aid creams		
Glamour cosmetics (hydrophobic)	Anti-acne preparations		
Bath oil	Rubs liniments and ointments		
Facial moisturizers			

**African countries where shea butter is produced for cosmetic utilization:** The major Shea producing countries in West Africa are Mali, Burkina Faso, Benin, Senegal, Ivory Coast, Ghana, Gambia and Nigeria. Nuts for export are collected from gatherers or are collected on a large scale by local commercial companies, landowners or co-operatives which hold term contracts with large foreign refining companies. Mali, the largest producer, is estimated to produce approximately 150,000 tonnes of nuts per year (Coulibaly *et al.*, 2009). The second and significantly smaller, but higher value export market is within the cosmetics industry, where small amounts of Shea butter are used as a component within skin moisturizing, sun-screening and skin healing products (Ferris *et al.*, 2001).

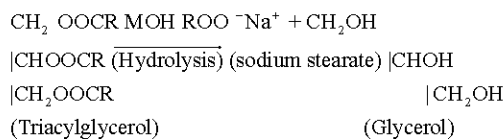
In Ghana there are businesses set up that have started producing cosmetic products based on shea butter. The production of cosmetics can be increased to a higher level as well at the quantitative side as well as the qualitative side. The main finished export shea products made in Ghana consist of a small range of products. In general: bars of shea soap in different varieties (natural shea butter, with added baobab leaves, henna leaves or black soap), jars with pure shea butter or with added flavours, lip care products in lipstick form, shower products, hand and body creams and lotions. The line of products consisting shea butter is slowly increasing, examples of relative new products are shampoos and conditioners, body lotions, massage creams and sunscreens. New markets are open and partly still unexplored for shea butter products; e.g., small hotel soaps, in Burkina Faso there are some companies working on this. In Ghana no companies are found that make hotel soaps consisting of shea butter. Looking at the shea export cosmetic products, many cosmetic products are gift wrapped; the shea butter is often packaged in calabashes or in ceramic jars with a cellophane cover. This adds value to the product but as well makes transport costs higher (Coulibaly *et al.*, 2009).

**Simple indigenous technology of soap production from shea butter:** A cold-process alkali hydrolysis of the shea nut oil which is a simple adoptable technology, was reported by Warra *et al.* (2009a) in producing shea butter soap. The traditional method of extraction of the shea nut oil was employed. The alkali solution used was prepared by dissolving 200 g of sodium hydroxide pellets in 1 dm<sup>3</sup> volumetric flask and the volume made to the mark with distilled water. For the soap formulation, the method reported by Warra (2009) was used. 200 g dm<sup>-3</sup> alkali solution was poured directly into 200 mL beaker containing shea nut oil in the ratio 1:1 (v/v) of the

mixture. The shea butter was warmed gently and was poured into the 200 mL beaker followed by the alkali solution and then stirred frequently for 10-15 min using a stirring rod. The thickened mixture was then poured into wooden moulds and allowed to harden by air-drying for 24 h to obtain the soap bars.

To reduce the harshness of soap which may be caused by excess sodium hydroxide, 10% excess fat and oil can be used in the formulations (super fatting) (Warra *et al.*, 2010, 2009b).

### **Chemical reaction in soap making (i.e., saponification reaction)**



where, R is the long chain of carbon and hydrogen atoms and M = Na or K

### **CONCLUSION**

It can be concluded that shea nut oil processing can be transformed into a substantial industry from production to marketing of wide range of cosmetic products.

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