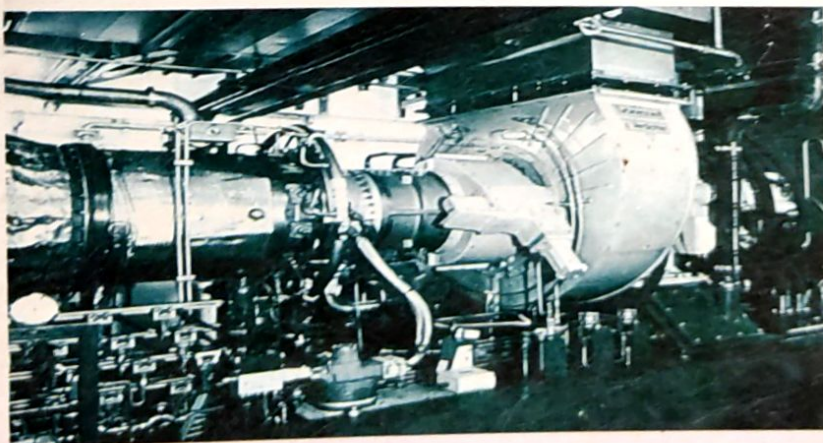




DEVELOPMENT JOURNAL OF SCIENCE AND TECHNOLOGY RESEARCH (DJOSTER)

Volume 3, Number 1, 2014

ISSN: 2143-3275



DEPARTMENT OF SCIENCE AND TECHNOLOGY
LIBRARY FUT MINNA
DATE

A Publication of the
Faculty of Applied Sciences and Technology,
Ibrahim Badamasi Babangida University,
Lapai, Niger State, Nigeria



INDIGENOUS METHODS OF PROCESSING SHEA BUTTER AND ITS ECONOMIC IMPORTANCE IN BIDA AND ENVIRONS

Kudu Dangana^{1*}, H. M. Liman¹, G. I. Kuta^{2*}, Mairo Muhammed², and H. A. Bello²

¹Department of Geography, Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria. *Email: k.dangana@yahoo.com (+2348065818344)

²Department of Geography, Federal University of Technology, Minna, Niger State, Nigeria *Email: garbainuwakuta@yahoo.com(+2348036781078)

Abstract

This study assessed the Indigenous methods of processing shea butter that has been passed on from generation to generation and storage procedures (materials and containers used/perceived shelf life of the products used for preservation and its economic importance). Little variation was found in indigenous processing methods, utilization and storage across most of the villages. The use of onion to improve the taste and smell of butter was found to be practiced in almost all the villages. Perception about shelf life of the butter was found to vary widely among the processors and consumers (3 months to 2 years). Though this was the main focus of the study, most of the indigenous processors and consumers had little experience as far as this problem was concerned. This was due to the fact that most of them consumed the butter within one or two months after processing and so the product is not kept long enough to give any appreciable signs of rancidity.

Key words: Shea butter, rancidity, indigenous methods, climate perception.

1.0. Introduction

Vitellaria paradoxa (the shea tree) is extremely important in the economic development of women in Patita Village. Termed "women's gold", and it is found in all Middle Belt of Guinea Savanna zone of Nigeria. The tree produces fruits and nuts which are of high economic value to the locals and the nation. Shea butter is extracted from the kernels of the fruit. Traditionally, shea nut processing into butter involves knowledge that has been passed on from generation to generation and is widely practiced by different tribes in Nigeria (Akihisa, 2010). The Shea belt communities of Nigeria Only women are involved in the traditional extraction business, which is hard work, time consuming and labour intensive. The wide variability in shea butter quality has been mainly attributed to the various traditional processing methods used. This has subsequently affected the country's ability to meet the standards demanded by the cosmetic and pharmaceutical industries for the traditionally processed butter. In order to incorporate relevant technology into the traditional processing system to improve their efficiency and quality, work has to be done to ascertain the perception of the traditional processors on factors affecting these parameters. The objective of this study therefore was to gather information on variations in methods of processing Shea butter, storage procedures, shelf life and processors. The study also looked at various uses of Shea butter in the communities studied.

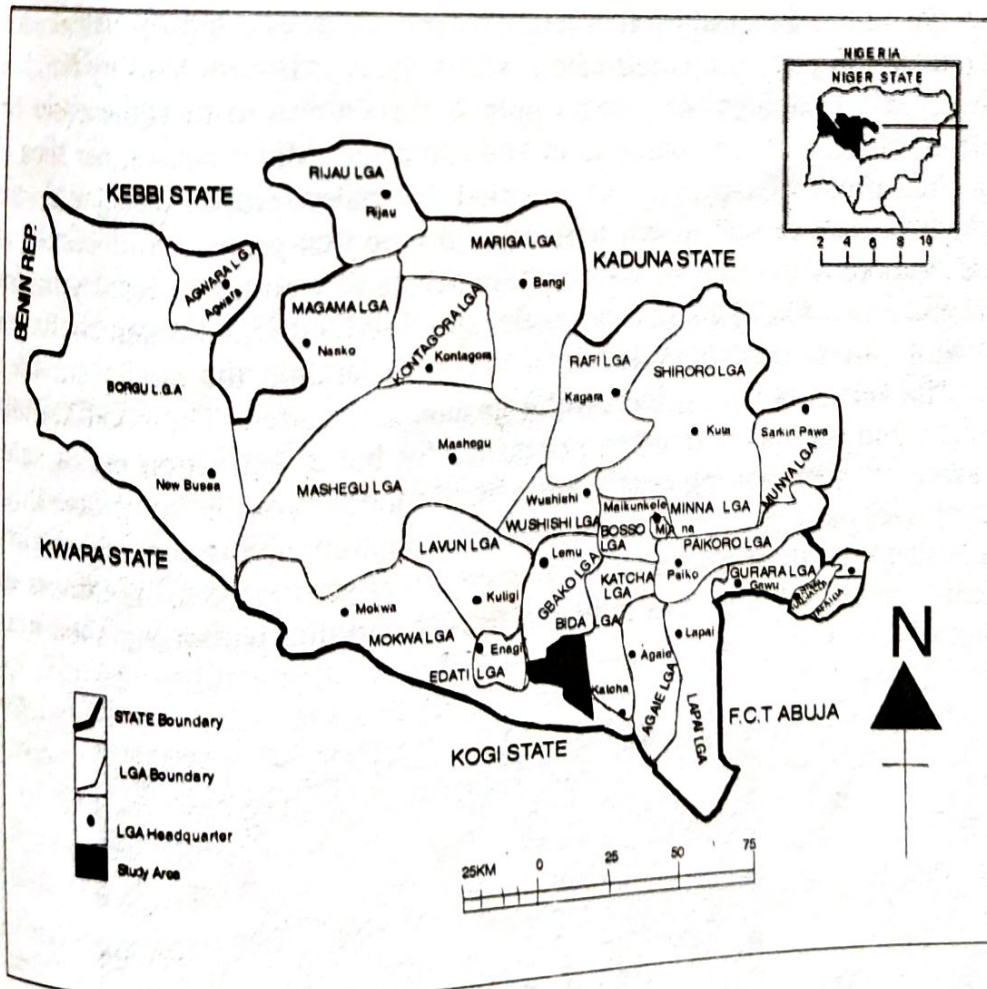
2.0. Description of the Study Area

Bida Local Government Area of Niger State located between latitude 8⁰ and 11⁰North and between longitude' and 4⁰.30' and 7⁰00 East and a population of 188,181 persons at the 2006



census (2006 Census Gazets). It is also located on the Nupe sandstone formation, which consist of plains with ironstone capped hills or mesas. The scenery is fairly uniform since lithology and dock structure are not greatly variable. An important feature of the scenery is the existence of large areas of fadama. The northern edge of the town consists of a broken – off Plateau. The town is drained by Chiken and Musa rivers, with Landzun which flows right across the heart of the town. The importance of these rivers is that they provide good irrigation opportunities for the inhabitants. Thus they are of both economic and social importance (Abubakar, 2003).

Being an ancient town one could still see the remnant of its former glory (City wall) here and there embracing the wide expanse of Bida. This ancient city wall estimated to measure more than 19 kilometers in circumference. Before it was demolished this wall had ten gates. Bida a traditional once walled city, is situated on a gentle slope of the river landzun which runs through its heart in a given swath of fadama (Abubakar, 2003). Bida has a mean annual rainfall of 1227mm with the highest mean monthly rainfall in September with 248mm. The rainy season starts on average between the 5th and 15th April and last just over 200 days. The mean monthly temperature is highest in March at 31 and lowest in August (Abubakar, 2003).



Source: Niger State Ministry of Land and Survey
Fig. 1. Map of Niger State Showing Bida Local Government Area

2.0. Materials and Methods
 An informal survey was carried out in the Patitagi, Etsu Audu, Essan and Gbadafut villages using a checklist/interview guide. The study was carried out between January 24 and March 2, 2013 in the Patitagi and Gbadafu and June 26 and July 9, 2013 in the Etsu Audu Villages. The team comprised

one Environmental Resources Planning Geographer and Final year students of Geography Department, stops were made at communities/villages where various processors (mainly women) were engaged in informal dialogue on the processes involved from the picking of nuts to oil extraction, storage and utilization using a checklist. The team also observed the processes involved in the extraction of oil accidentally or through booking in some of the communities visited. Non-governmental organizations and other groups and others associated with the shea products; as well as large scale commercial processors within the areas were also interviewed. At least two interviews of individuals and/or groups were carried out per community. The study covered field collection of nuts for processing and storage of butter. Since the processes did not vary much within the study areas, a general description of the processes involved is presented.

3.0. Results and Discussions

3.1 Collection and Processing of Nuts

Shea tree generally grows in the wild, the fruits are picked from anywhere apart from individual farms'. The picking is therefore done very early in the morning on a first come first served basis. Some nuts are picked under tall shady trees which were originally picked from shea trees by bats and other birds for the pulp. These are generally much matured and clean as the pulp has already been removed. At home, healthy and tasty pulps are eaten whilst the rest is depulped by hand or foot and parboiled for between 5-10 minutes. Any extra pulp is then removed in some cases by dragging on a rough surface or with the aid of coarse sand and sun dried. Major season for shea is around April/May in Patita, Gbadafu and Essan. It was revealed that minor season fruit yields are low and not easy to pick since weeds had out grown with rains during that period. Nuts picked at this time are however, more matured and produces more and better quality butter. After drying for about a day or two, the nuts are cracked with a stone or pestle, sun dried with the broken shells for another day or two. The whole lot is then pounded in a deep mortar and the shells are then separated from the kernels. The kernel is well dried on the ground and sorted. The good kernels are stored mostly in jute sacks and used as and when necessary for butter extraction or for sale. The respondents strongly agreed that parboiling was a very important step in the nut processing. Improper parboiling (under or over parboiling affects process of extraction, percentage and quality of oil) and exposure of parboiled nuts to rain also has the same effect as it leads to moldiness of nuts. This result in production of bitter butter and it was also reported that parboiling shea nuts improves shea butter quality.



Fig. 2. Shea Butter tree and Unprocessed Shea nuts



3.2 Preparation of Kernels for Oil Extraction

The traditional process of shea butter extraction begins with the breaking of good quality kernels into smaller pieces either with a stone on the floor or in a mortar with a pestle. The pieces are then fried in a iron pot using Shea butter. The fried pieces are further pounded in a mortar to make the coarse pieces much finer and then ground into slurry using a grinding stone as in most villages or sent straight to the mill after frying. Percentage extraction is better with the mill as grinding is better than with the stone. Properly fried broken kernels, when taken to the mill come out very fluid, while insufficiently fried nuts cause the paste to exit the mill in lumps, yielding less butter when extracted. Over frying darkens butter colour and also prolongs the process of extraction. We estimated a period ranging between 30-40 minutes for frying. In Patita village, test for complete frying is carried out by taking samples from time to time and breaking to see if it is dry. In Etsu Audu, samples are taken periodically and few drops of water added. A characteristic sound like the one that is obtained when drops of water is added to oil ready for frying means roasting is complete. It was obvious that, the tests were highly variable resulting in varying levels of frying. The first case requires more experience than the simple test described for the second village. Processors, however, understood fairly well the need to have a properly fried kernel for good quality butter. This assertion seems to be scientifically supported by (Hall et al., 1996) who reported sensorial characteristics of shea and cocoa butters to be linked to the kernel roasting time. Similar works by Kapseu et al. (2005) and Womeni et al. (2006) indicated physicochemical quality of shea butters depended on the drying and roasting time of the shea nut kernels.

3.3 Kneading and Oil Extraction

After grinding or milling and cooling, the paste is further diluted with 2-3 parts by volume of water and catalyst called Konte in Nupe Language is added and then Kneading is first started with cold water and when it begins to turn whitish, hot water is added to complete the process. In the traditional method, kneading is done with both hands and Stick in large mortar until the whole mass turns from light or dark brown to a whitish pulp.

At this stage, the mass expands, becomes less greasy and no longer sticks to the hands. The mass is then washed with cold water, to obtain a pure white mass which is scooped into Iron plate and boiled to clarify. The whole mass is heated till most of the water evaporates, and it turns from light brown Or dark brown to white and the impurities settle at the bottom of the pot leaving the butter on top. The pot is then removed from the fire, allowed to cool with all the debris settling. The oil is then sieved from the debris and put in a container for storage and usage. After cooling the butter is stirred to give a smooth creamy butter. It should be noted that it is at the stage of kneading that most of the problems associated with the traditional method of extraction are encountered. As mentioned above, the quality of nuts (which in itself is a function of types of nuts collected from the field and the process of parboiling and drying), roasting etc., can prolong this process and sometimes make it impossible to complete the extraction process or result in very low extraction Percentage (Womeni, 2006).

At Etsu Audu Village for example, 12 women said that in the process of extraction, particularly during the breaking of nuts and kneading phase any contamination with chicken droppings or common salt hinders the extraction process and sometimes result in no oil at all. It is not clear why this is the case and therefore it needs further investigation. The women in this community said that for every 3 bowls of nuts, they obtain one bowl of butter giving roughly a yield of 33%. While



women in Atsu Audu and Pattitagi tends to add extracts from a local fruit, known as konte to the grinded fluid when the kneading tends to be difficult and yielding little butter. Extraction is done outside the Village and when the women asked said this is because of prolonged heating, when done inside the Village it causes measles.

3.4 Storage and Utilization

Butter stores better in plastic containers, earthenware pots and calabashes which are poor conductors of heat and rust free. The butter after cooling is usually stirred continuously until it begins to solidify, thicken and then poured into the container for storage. The stirring is to make the butter smooth and prevent lumps from forming. This process expels air and thickens the butter making it harder. Butter in this state does not melt easily and stores longer. Those who process and sell on local markets do not make their butter that hard to facilitate cutting into lumps for sale. At Bida the butter is taken to market and measured with measuring pan or cut in lumps for sale. In the rural areas of Bida shea butter is commonly used oil. It is the oil used when any type of food requiring oil is being prepared. People melt and added to many food preparations like boiled cowpea, Bambara nuts, groundnuts etc., and eat with only salt and pepper. Most of the butter produced by the indigenous people is for domestic consumption. It is also used for soups and stews. The shea oil is second to that from ground nut widely cultivated in the area.

3.5 Traditional/Medicinal Uses

All herbal preparations that requires oil uses shea butter. The butter is used directly for the treatment of fractures and sprains, and also for massaging babies. At Etsu Audu in Gbako LGA herbalists stop people with certain diseases like chest pains from consuming butter during the period of treatment. It is melted and used by some people as pomade. The butter is also used for preparing soap. Caustic for the preparation of soap in this regard comes from a variety of sources like millet straws, ashes from shea expeller cake, silk cotton (Schreckenberg, 2004).

3.6 Residues

The waste water resulting from the washing of the mass after kneading is either poured on walls in some communities to reduce erosion prolonged their lifespan or drained and allowed to dry and burnt to produce ash for soap manufacturing. A lady at Patitagi claimed that the fluid can be poured into termite mounds to generate predatory ants for biological control of the termites. We are unable to confirm if the ants are really generated by the waste or rather attracted by it etc. The cake after boiling and extracting butter is used as fuel and also used as fertilizer on the farm (Schreckenberg, 2004)

3.7 Colour and Rancidity

Natural butter colour ranges from white to light yellow. The results from the study indicate that colour depends not only on quality of nuts but also on the processes involved in extraction. Most of the processors said the number of times the mass is washed after kneading before heating to extract the oil affects the colour. The higher the number of washings is, the whiter the butter becomes. Aculey (2008) confirmed this claim since the number of washings is inversely related to the amount of antioxidants left in the oil as these contribute to the colour spectrum. Washing once gives a bright yellow colour but results in bitter oil taste. Most people who want to obtain a light yellow colour therefore wash twice. Washing thrice results in light creamy white colour of the butter. Most of the women said price is independent of colour but that in times of glut, traders'



preference is more towards yellow. However throughout the areas studied only Etsu Audu women intentionally add colour to their butter, especially, that produced for the market.

3.8 Rancidity

Rancidity is the development of unpleasant flavours and odours in oils and fats as a result of oxidation. Though this was not the main focus of the study, most of the processors and consumers had little experience as far as this problem is concerned. This is due to the fact that most of them consume the butter within one or two months after processing and so the product is not kept long enough to give any appreciable signs of rancidity. A lot of people claimed the butter can store for years without any problems but have by themselves never stored for even 4 months. Most respondents stored butter only for short periods and had little experience with rancidity. Apart from following proper processing procedures there were no traditional methods of preventing or reducing rancidity.

4.0. Conclusions

The study found little variation in indigenous methods of processing storage and utilization of butter within the study area. Quality of butter is a function of the quality of nuts (which in itself is a function of types of nuts collected from the field and the process of parboiling and drying) roasting etc.. Only Etsu Audu women add colour to the butter. Further investigations however need to be carried out to find out if these additives have any other desirable characteristics as far as preservation of butter is concerned. Most respondents claimed butter can be stored for a year without any problems. Most of them have however seldom stored butter beyond 1-2 months and so have not experienced any perceived rancidity. In Bida town that women interviewed said they stored butter for just one or two month. They observe element of rancidity and purified the butter with water and fresh onion. This also needs more investigation as this process also improves the taste and smell of the butter as this could potentially increase the demand of the butter for consumption among consumers.

References

- Aculey, P.C. (2008) Chemist, Biochemistry and Physiology, Division Cocoa Research Institute of Ghana, Tafo, Personal Communication, 2008.
- Akihisa, T., Kojima, N., Kikuchi, T., Yasukawa, K., Tokuda, H., Masters, E., Manosroi, A. and Mano, M. (2010). "Anti-inflammatory and chemopreventive effects of triterpene cinnamates and acetates from shea fat". *Journal of Oleo Science* 59 (6): 273–80.
- Alfred T. (2002). "Fats and Fatty Oils". *Ullmann's Encyclopedia of Industrial Chemistry*. Weinheim: Wiley-VCH. doi:10.1002/14356007.a10_173.
- Ayeh, F. Y. O. (1988) Effect of *Cochlospermum planchonii* Dye on Shea Butter, Cocoa Research Institute of Ghana, Annual Report 89 (1988) 123-124.
- Elias, M. and Carney, J. (2004) The female hierarchy of sheanut: Burkinabe producer, green consumers, western and fair trade. *Geographical Book of Quebec* 48:1-26. (In French)
- Fanni, J. and Parmentier, M. (2006) Applying the method to dry frying shea kernels: Influence on chemical indices of quality and properties. *Oléagineux, Corps Gras, Lipides* 13, 297-302. (In French)
- Fold, N. (2000). *Union Cahiers d'Economie et Sociologie Rurales*. 55/56: 92–110".



- Hall, J.B., Aebischer, D.P., Tomlinson, H.F., Osei-Amaning, E. and Hindle, J.R. (1996) *Vitellaria Paradoxa*, School of Agricultural and Forest Sciences Publication, No. 8, University of Wales, Bangor, p1-105.
- Kapseu, C., Womeni, H. M., Ndjouenkeu, R., Tchouanguép, T. and Parmentier, M. (2005) Influence of processing of almonds on the quality of shea butter, Proc. Biol. Alim 3 (2005) 1-18. (In French).
- Louppe, D. (1995) *Le karité en Côte d'Ivoire*, Report of the Forestry Institute of Côte d'Ivoire (DEFOR), p. 19.
- Pontillon, J. and Cocoa, B. I. K. (1996) In: Karleskind, A. and Wolff, J.P. (Eds.): *Oils and Fats Manual*, Lavoisier, Paris, p206-212.
- Sanz, C., Ansorena, D. and Bello, J. (2001) The collection of linearization of the temperature and time of free space for the identification of volatile compounds in ground roasted Arabica coffee, *Journal of Chem. Agricultural Alimentarius* 49: 1364-1369. (In French).
- Schreckenber, K. (2004) The contribution of shea butter (*Vitellaria paradoxa* C.F. Gaertner) to local livelihoods in Benin, In: Sunderland, T. and Ndoye, O. (Eds.), *Forest Products, Livelihoods and Conservation*. Indonesian Printer, Indonesia, Vol. 2, p.91-113.
- Semmelroch, P. and Grosch, W. (1998) Studies on character impact odorants of coffee brews, *Journal of Agricultural Chemistry* 44:537-543.