



SURVEY OF AFRICAN STAR APPLE (*Chrysophyllum albidum*) FRUITS MARKETING IN SOKOTO METROPOLIS, SOKOTO STATE, NIGERIA

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ABSTRACT

The study examined the marketing of African Star Apple (*Chrysophyllum albidum*) fruits in Sokoto Metropolis, Sokoto state with a view to identify the socio-economic characteristics of the marketers, the marketing channels of *C. albidum* fruits as well as ascertain the profitability of *C. albidum* fruits marketing in the study area. The targeted population of the study was *Chrysophyllum albidum* fruits marketers. Snow balling technique was used to select one hundred (100) marketers of *C. albidum* fruits which is the sample size for the study. Data were analyzed using descriptive statistics, channels, profit, and gross margin. The result revealed that *C. albidum* fruits marketing in the study area was 100% dominated by male, 49% were within the age range of 21-30 years, 70% were married, 77% had Qur'anic education, 35% had family size that was between 6-10 persons, 53% had farming as their primary occupation and 77.0% had *C. albidum* fruits business as their secondary occupation. 78.0% of the marketers obtained their *C. albidum* fruits from the wholesalers, 36.0% of the marketers obtain a daily income that was between ₦1,001 to ₦2,000, the respondents had average total revenue of ₦674,156.25, average cost on transportation was ₦36,605.25 per season, and the marketers also had an average profit of ₦79,598.25 and gross margin of 11.81% per season. It is therefore concluded that *Chrysophyllum albidum* fruit marketing business is a profitable venture in the area. For the successful and continuous supply of *Chrysophyllum albidum* fruits on a sustained basis, there is a need for afforestation and plantation of *Chrysophyllum albidum* tree species in the study areas as a community development forest plantation programme.

Keywords: *Chrysophyllum albidum*; afforestation; marketing; profitability

INTRODUCTION

In West African countries, some forest trees serve as alternative sources of food, especially during the hungry season (e.g between November and April when food crops are planted) and thus, contribute to food security and increase the diversity of foods necessary to reduce monotony in the diet of rural people. In addition, the edible parts (e.g fruits or seeds) of these tree species could be processed into conventional products like jams, marmalade, alcohol, soaps, candles, jelly and chewing gums, table oil, margarine etc (Shiembo, 1996; Adisa, 2002). There is a growing concern for everyone to start acknowledging and utilizing

most underutilized plants around us. The point remains that these plants are potential sources of foods, medicines and basic support to humans, animals, and our environments. Even though the use of certain plants as a treatment regimen for certain ailments have been in practice for a long time, yet most people are unaware of the basic things they can benefit from these plants. Below is a group of medicinal plants that offer several therapeutic and medicinal benefits. However, it is quite disheartening that these tree species are receiving less attention despite the countless benefits we stand to gain from them. One of such underutilized yet powerful group of plants is *Chrysophyllum*.

There are over 86 species of *Chrysophyllum* for example, *Chrysophyllum albidum*, *C. cainito*, *C. oliviforme*, *C. roxburghii*, *C. imperiale*, *C. viridifolium*, *C. eximium*, *C. contumacense*, *C. delphinense*, *C. durifructum*, *C. fenerivense*, *C. novoguineense*, *C. ogowense*, *C. marginatum*, *C. mexicanum*, *C. masoalense*, *C. muerense*, *C. cuneifolium*, *C. euryphyllum*, *C. acreanum*, *C. africanum*, *C. akusae*, to list but a few. *Chrysophyllum* is a group of tropical plants that belong to the Sapotaceae family. *Chrysophyllum albidum* is known as udala or udara by Igbo people, agbaluba by Hausa people, eha by Ebira, agbalumo, agwaluma or osan by Yoruba, Utieagadava by Urhobo people and ehya by the Igala people. The Sierra Leone people also refer to the fruit as bobiwata or breast milk fruit (Adepoju and Adeniji, 2012).

Forest is a source of livelihood for many farmers and rural households in developing countries, especially in Sub-Saharan Africa. It has been observed that hundreds of millions of people rely on forest for their income, food, health, water, and environmental services. Therefore, forest has developed linkages with the agricultural sectors, encompassing crop production, livestock, fishery, and wildlife in southern Nigeria (Adepoju and Adeniji, 2012). The high value placed on edible forest and wildlife resources by various users has stimulated their increased demand in many areas, thus creating markets for producers and sellers of the product at different levels and locations, overseas inclusive (Ijeomah *et al.*, 2015). The involvement of households in business opportunities created by this increased demand has helped in employing many people including non-users of edible forest and wildlife products. Attempts to increase revenue generation by marketers of these products, in the face of continuously increasing economic hardship instigated by rapid population increase have stimulated investigations for enhanced knowledge on ways of utilizing these species (Ugwu and Umeh, 2015). Wildlife resources serve as a source of bush meat in many localities. Due to the increase in world population, there is tremendous demand for food including protein and minerals (Ijeomah *et al.*, 2015). Forest resources are highly valued as source of natural medicine. All edible forest and wildlife resources are mostly considered as non-timber forest products (NTFPs). It is obvious that wood/ timber is not edible and thereby excluded. Utilization of these edible forest and wildlife resources varies from one region to another (Ijeomah *et al.*, 2015).

The edible products from these forest tree species are important for food security and have been noted to contain high level of vitamin C, minerals, sugar, and proteins, thus playing an important role in the nutritional balance of the people (FAO, 1999). Their barks, leaves, fruits, roots, and seeds could be used to cure a variety of sickness and diseases (FAO, 1999; Adewusi, 1997), thus contributing to the health care delivery. Also, they contribute significantly to rural poverty alleviation by providing employment and enhancing economic importance of rural dwellers through the collection, processing, and marketing of forest products such as fruits, seeds, leaves, roots, etc (FAO, 1986). Some of the forest food tree species that has been noted to have high socio-economic importance are *Chrysophyllum*

albidum, *Parkia biglobosa*, *Vitellaria paradoza*, and *Vitex doniana* among others. *Chrysophyllum albidum* fruits, also called African star apple, are widely eaten in Southern Nigeria, being popular especially with children and women. The species can be propagated from seeds and buds; through the latter is not easy. *C. albidum* belong to the family Sapotaceae. It is primarily a forest tree species that is widely distributed in West, Central and East Africa (Keay, 2009). The geographic distribution of the species includes Nigeria, Ghana, Kenya, Sierra Leon, Sudan, Uganda, Cameroon, Cote d' ivore, Central Africa Republic, Chad and Democratic Republic of Congo (Bada, 1997; Onyekwelu and Stimm, 2011).

Despite its importance, *C. albidum* and other forest food tree species have been greatly neglected; the yield of current *C. albidum* trees is decreasing due to old age and the fact that they have been harvested for decades. Thus, if current practice of allowing *C. albidum* to grow in the wild (i.e natural regeneration) with no plantations, the probability of obtaining its much-valued fruits on sustained basis will be very low. Due to the lack of care and old age, a lot of the tree species have died or are in the process of doing so. In Nigeria, *C. albidum* is classified among the endangered tree species (FORMECU, 1999), with a high possibility of going into extinction in the near future except something is done to conserve the species or increase its population. Consequently, this study was to determine the market analysis of *Chrysophyllum albidum* in Sokoto metropolis. The fleshy and juicy fruits, which are popularly eaten, are the potential source of a soft drink (ICRAF, 2007). The fruits are also suitable to produce fruit jams and jellies (Ureigho and Ekeke, 2010; Onyekwelu *et al.*, 2011). It is reported as an excellent source of vitamins, irons, flavours to diets and raw materials to some manufacturing industries (Adisa, 2002). The bark, foliage, and fruit of some *Chrysophyllum* species are also used in traditional medicines. The African star apple is produced commercially in West Africa (Amusa *et al.*, 2003; Falade and Aworh, 2004). For sustainable development, the data will serve as base-line information for future research. The major objective of this paper was to determine the marketing of *Chrysophyllum albidum* fruits (African Star Apple) in Sokoto Metropolis, Sokoto state. Nigeria.

METHODOLOGY

Study Area

The study was carried out in Sokoto metropolis which comprises of Sokoto North, Sokoto South, Wamako, Dange Shuni, Kware and Bodinga LGAs. Sokoto is located on latitude 11° 30' to 13° 50'N and longitude 4° to 6° 4'E. Sokoto state has a projected population of 5.1 million in 2015 while in 2017, the population of Sokoto was estimated to be close to 5.4 million (USAID, 2017). Sokoto is in the dry Sahel surrounded by sandy savannah and isolated hills, with an annual average temperature of 28.3°C (82.9°F). Sokoto is one of the hottest cities in Nigeria, however, the average daytime temperatures are generally under 40°C (104.0°F) most of the year and the dryness makes the heat bearable (Sokoto Energy Research Center, 2012; Anonymous, 2015). The warmest months are March to May, where the daily temperatures can exceed 40°C (113.0°F). The people of the state are Muslims and Islamic religion provides them with a code of conduct and behavior. Their mode of dress is also of Islamic origin. Two major festivals namely, Eid-el-fitri and Eid-el-kabir are celebrated every year. Laterite, limestone, kaolin, phosphate and silica sand are the mineral raw materials found in the area. Its agro raw materials are millet, cowpea, carrots, tomatoes, hides and skin, livestock, vegetables among others (Ogigirigi, 1993).

Sampling Procedure

The targeted population of the study was *Chrysophyllum albidum* fruits marketers. A preliminary survey was conducted across the metropolis to identify the markets where *C. albidum* fruits were sold. The major markets identified include Kasuwar Abu Dan Kure, Sokoto Central Market, Ramin Kura market, Wamako, Dange Shuni, Kware and Bodinga markets. Based on the information from preliminary survey Kasuwar Ramin Kura was purposively selected to identify the marketers of *C. albidum* fruits and this is because the marketers in the remaining markets obtained the fruits from this major market. Snow balling technique was used to randomly select one hundred marketers of *C. albidum* fruits across the Metropolis for the study. Twenty (20) respondents were randomly selected from each of the two core LGAs (that is Sokoto North and Sokoto South), while 15 respondents were randomly selected from adjacent LGAs of Wamako, Dange Shuni, Kware and Bodinga thus having a total sample size of 100 respondents.

Data Collection

Data were collected using semi-structured questionnaire and oral interview especially with the respondents that are not literate enough to complete the questionnaire. Information collected on socio-economic characteristics which include sex, age, marital status, household size, educational background, primary and secondary occupation among others. Data on marketing channels and profitability were also collected from the respondents. Secondary information was obtained from textbooks, relevant past projects, and journals.

Data Analysis

Descriptive statistics such as percentages, frequencies, pie-charts and bar charts were used to analyse data on socio-economic characteristics and marketing channels. Gross or profit margin analysis was used to analyse profitability of *C. albidum* fruits marketing. Gross profit is the profit a company makes after deducting the costs associated with the marketing and selling of its products, or the cost associated with providing its services. It can be calculated by subtracting the cost of goods sold (COGS) from the total sales revenue. It tells how good a company is at creating a product or providing a service when compared to its competitors. Statistical Package for Social Science (SPSS) was used for the analysis.

$$\text{Gross Profit} = \text{Total Sales Revenue} - \text{Cost of Goods Sold}$$

Gross profit margin is a company's gross profit divided by the total revenue, expressed in percentage. Company uses gross margin to measure how their products cost relate to their revenue.

$$\text{Gross Profit Margin (\%)} = \frac{\text{Gross Profit}}{\text{Total Sales Revenue}} \times 100$$

RESULTS AND DISCUSSION

Demographic Characteristics of Respondents

Demographic characteristics of the respondent are important human attributes that play a significant role in the marketing of *C. albidum*. The variables identified and analyzed included age, sex (gender), marital status, level of education, primary and secondary occupation (Table 1).

Table 1: Socio-economic characteristics of the respondents (N=120)

Variables	Frequency	Percentage
Sex		
Male	100	100.0
Female	0	0.0
Age		
21-30	49	49.0
31-40	31	31.0
41-50	14	14.0
51 and above	6	6.0
Marital Status		
Single	26	26.0
Married	70	70.0
Divorced	4	4.0
Household size		
0-5	19	19.0
6-10	35	35.0
11-15	18	18.0
16 and above	28	28.0
Educational background		
Qur'anic	77	77.0
Primary	18	18.0
Secondary	5	5.0
Tertiary	0	0.0
Others	0	0.0
Primary occupation		
Farming	53	53.0
Fishing	10	10.0
<i>C. albidum</i> business	19	19.0
Trading	4	4.0
Others	14	14.0
Secondary occupation		
<i>C. albidum</i> business	77	77.0
Trading	1	1.0
Tailoring	6	6.0
Farming	13	13.0
Others	3	3.0

The entire respondents (100%) were male as indicated in Table 1. The reason is probably due to location and religious belief. The nature of the job, it is extremely physical and delicate thereby, limiting the involvement of women. Most of the women in the study area have limited participation in outdoor activities due to religious or cultural beliefs. This was in line with the findings of Suleiman *et al.* (2017) who stated that male headed the households are more likely to be more dependent on forest resources than female households and due to cultural barriers, which limit women participation in non-timber forest products activities.

About half (49%) of the respondents are within the age range of 21 – 30 years, which are mostly youths that dominated the marketing of *C. albidum* fruits; since youth are more agile and they can be able to push the wheelbarrow from one point to the other to sell the fruits to the consumers. The result is in line with the findings of Senchi and Malami (2015) who reported that most of the honey producers and marketers were within the active labour force where younger individuals participated more than the elderly.

Majority (70.0%) of the respondents were married. This could be attributed to the responsibilities held by the married men who tend to work hard in order to provide the needs for the family than unmarried ones. The result agrees with the findings of Olarinde *et al.* (2008) who reported that one of the most important factors which determine technical efficiency of a business is the marital status of an individual. This is because married people work hard to meet up with the demand of the family members.

In terms of educational attainment, majority of the respondents (77%) had Quranic education which have given them background knowledge that is needed in practicing of their religion but did not attend any school because most of them are farmers from nearby villages, they only came to the markets to engage themselves in other businesses during dry season after harvesting their farm produce. This result disagrees with the findings of Eze (2006) who reported that the individuals that are educated are likely to respond much more positively to trade than those who do not have the opportunity to any formal education.

The study also confirmed that most of the respondents had a household size of between 6-10 persons. This result is in line with the findings of Maurice *et al.* (2015) who reported that the family size of the majority (35%) of the respondents was within 6-10 persons.

More than half (53%) of the *C. albidum* marketers had farming as their primary occupation, this is because majority of them are from the surrounding villages, and they engaged in this business during dry season after they had harvested their farm produce. This is because most of these people depend on Nontimber Forest Products (NTFPs) as their source of income and food. This result agreed with the findings of Jimoh and Azeez (2002) who stated that households who engaged in other sectors of the economy such as traders and formal employment are less dependent on NTFPs compared with their counterparts in the farming enterprise. Findings of this study (Table 1) further revealed that majority of the respondents (77%) had *C. albidum* business as their secondary occupation. The result agreed with the findings of Okafor (2011) who reported that flowering of *C. albidum* occurs at various times such as January-February; April-June and September.

Marketing Channels of *Chrysophyllum albidum* fruits

Figure 2: indicates how *C. albidum* marketers obtained their products (*C. albidum* fruits).

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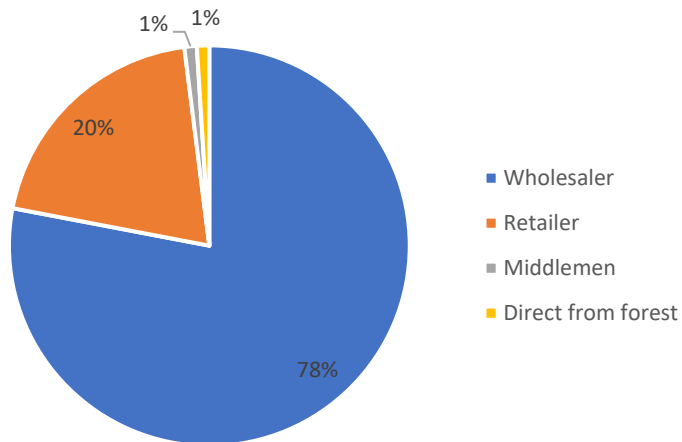


Figure 2: Distribution of the respondents based on how they obtained their *C. albidum* fruits

The result revealed that majority of the respondents obtained their *C. albidum* fruits from wholesalers (Fig 2). This is because wholesalers often offered the fruits for them on credits and at cheaper prices. This had encouraged them to obtain their *C. albidum* fruits from the wholesalers. As a result of these services received from the wholesalers, the respondents had no problem of capital before embarking in *C. albidum* business. The result indicated that there is always a middleman in the marketing channel of NTFPs. This result also agreed with the finding of GoWB (2005) who mentioned that there is always a middleman, connected with the trade of NTFPs whether it is consumable items or medicinal plants.

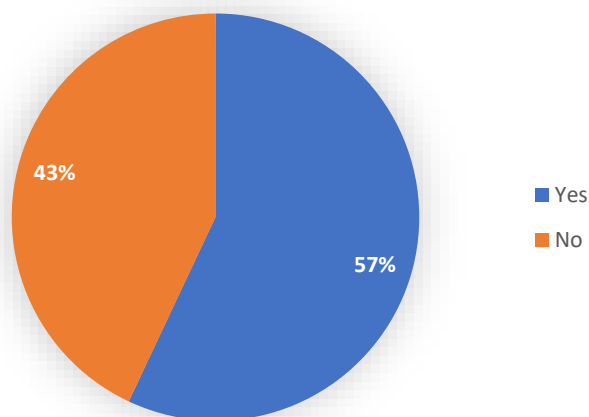


Figure 3: Percentage respondents that belong to the association of *C. albidum* marketers

Figure 3 revealed that majority (57.0%) of the respondents belongs to the *C. albidum* fruits marketers' association which had given them opportunity such as maintenance of peaceful co-existence, offered the products for them on credits, discuss the problems faced in the business, given loan to the members, reduction in the price of the product, among others, over those that does not belong to the association (43.0%). This is contrary to the findings of Omotesho *et al.* (2013) who stated that majority of the intermediaries were not members of the cooperative society.

Table 2: Profitability of *C. albidum* fruits marketing (₵ 100)

Variable	Frequency	Percentage (%)
Business scale		
Small scale	45	45.0
Medium scale	52	52.0
Large scale	3	3.0
Daily income (₵)		
100-1000	19	19.0
1,001-2,000	36	36.0
2,001-3,000	30	30.0
3,001 and above	15	15.0

More than half (52%) of the respondents engaged in medium scale of *C. albidum* business. This is an indication that *C. albidum* marketing is a profitable business in the study area. This could be attributed to the fact that, even without capital wholesalers are ready to offer the fruits of *C. albidum* for the marketers on credits and this had enabled the respondents to expand their business scale. Findings of this study are contrary with the findings of Risper (2015) who reported that, most beekeepers fetch very low prices in the market because they sold honey on its raw form which restricted the marketers to small scale production as they lack necessary capital to expand their enterprises. The result indicated that 36.0% of the respondents realized from their daily income the range of ₵1, 001 to ₵2,000 from the sales of *C. albidum* fruits. This showed that *C. albidum* business is a profitable business that generates income and food for the people. The result was in line with the findings of Albert and Emanuel (2010) who indicated that NTFPs contribute significantly to the food security, poverty reduction and livelihood development of the people in Ghana.

Table 3: Distribution of fruit marketers based on the quantity of fruits sold daily

Quantity of fruits sold (basket)	Frequency	Percentage (%)
½	9	9.0
1	44	44.0
1 ½	33	33.0
2	13	13.0
2 ½ and above	1	1.0
Total	100	100.0

This also indicated that the respondents were able to sell all the quantities of *C. albidum* fruits they bought per day due to high demand by the consumers most especially women and children. The result showed that 44.0% of the *C. albidum* fruits marketers sold one basket of *C. albidum* fruits per day. This could be attributed to the high demand for *C.*

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albidum fruits most especially by women and children in the study area. This finding agrees with Key (2009) who reported that African star apple (*C. albidum*) is widely eaten in Southern Nigeria, being popular especially with children and women. The result also showed that the respondents (13.0%) sold up to 2 baskets of *C. albidum* fruits per day. This indicated that selling of *C. albidum* fruits can reduce unemployment among the Nigerian youths by encouraging them to engage in non-timber forest products business. The findings agreed with Olagunju and Ajetomobi (2003) who reported that non-timber forest products (honey) business is a profitable venture and that unemployment among the Nigerian Youths can be reduced by encouraging them to engage in beekeeping.

Table 4: Average profit of the respondents per season (3 months)

Items	Average Amount (₦)
Total revenue (TR)	674,156.25
Cost on <i>C. albidum</i> fruits purchased	557,952.75
Transportation cost	36,605.25
Total cost	594,558.00
Profit	79,598.25
%Gross margin	11.81%

The findings indicated that the average total revenue (Table 4) of the *C. albidum* fruits marketing was ₦674,156.25 per season. The result also showed that the average total seasonal cost of *C. albidum* purchased by the respondents was ₦557,952.75. This was as a result of high demand for the fruits usually when it appears newly in the market, but the prices gradually reduce when it is much available in the market. Finally, it was discovered from the results that *C. albidum* business is profitable in the study area. This result was in line with the findings of (Omotesho *et al.*, 2013) who reported that marketing of African Star Apple (*C. albidum*) was profitable.

The research of the study showed that the average cost of the respondents on transportation was ₦36,605.25 was very low, which generate more profit to the respondents. The findings agreed with Taru and Ndaghu (2013) who stated that cost of transportation on fuel wood was very low, and this can provide more profit to the marketers.

The result of the research revealed that the gross margin of the *C. albidum* marketers was 11.81%, which revealed that *C. albidum* business was efficient in the study area. The result agreed with the findings of Omotesho *et al.* (2013) who stated that, in Kwara State marketing of *C. albidum* fruits was very efficient.

CONCLUSION

In conclusion, the result showed that the market was dominated by males that were within the age range of 21-30 years. Majority of the respondents (52%) were involved in medium scale of *C. albidum* marketing, this was attributed to high demand by the people and fruits were being offered on credits to retailers by the wholesalers. The average profit obtained by the respondents was ₦79, 598.25 per season and average gross margin of the respondents was 11.81%. This implies that, marketing of *C. albidum* fruits is a profitable business.

The cooperative societies should work together in order to ensure that the prices of a fruit and that of the basket were reduced and fixed in such a way that will be affordable for

the consumers. The women should also be encouraged to participate in the *C. albidum* fruits business, as this will provide them with source of income in improving their livelihood. There should be awareness in the study area that, *C. albidum* fruits marketing is a profitable business.

REFERENCES

- Adepoju, O. T. and Adeniji, P. O. (2012). Nutrient composition and micronutrient potential of three wildy grown varieties of African Star Apple (*Chrysophyllum albidum*) from Nigeria. *African Journal of Food Science*, 6(12): 344-348.
- Adewusi, H. A. (1997). The African Star Apple (*Chrysophyllum albidum*) indigenous knowledge (I K) from Ibadan, Southwestern Nigeria. In: Denton O A, Ladipo D.O, Adetoro M.A. Sarumi M B (Eds.) Proceedings of a National Workshop on the Potentials of the Star Apple in Nigeria, CENTRAD Nigeria pp: 25-33. Retrieved 13th May, 2018 10:08am.
- Adisa S. A. (2002). Vitamin C, Protein and mineral content of African Apple (*Chrysophyllum albidum*) In: Garba S.A., Ijagbone I.F., Iyagba A.O. Iyamu A.O., Kilani A.S., Ufauna N (Eds.). Proceedings of the 18th Annual Conference of NIST, pp. 141-146. Retrieved on 10th July, 2018 by 11:25pm.
- Albert A. and Emanuel, B. (2010). Commercialization of non-timber forest products in Ghana: Processing, packaging and marketing. *Journal of Food, Agriculture and Environment*, 8(2): 962-969.
- Amusa, N. A., Ashaye, O. A. and Oladapo, M. O. (2003). Biodeterioration of the African star apple (*Chrysophyllum albidum*) in storage and the effect on its food value, *African Journal of Biotechnology*, 2: pp.56-57.
- Anonymous (2015). <http://itouchmap.com/latlong.html>. Retrieved 06/09/2019. 3:25pm
- Bada, S.O. (1997). Preliminary information on the ecology of *Chrysophyllum albidum* in West and Central Africa, In Proceedings of a National Workshop on the Potentials of the Star Apple in Nigeria CENTRAD Nigeria Ibadan.
- Eze, L. (2006). Strict upper error bounds on calculated outputs of interest for linear and non-linear structural problems. *Comptes Rendus Academie des Sciences*. Paris, 334(7):399-407, 2006
- Falade, K.O. and Aworh, O. C. (2004). Adsorption isotherms of osmo-oven dried African star apple (*Chrysophyllum albidum*) and African mango (*Irvingia gabonensis*) slices. *European Food Research and Technology*, 218,278–283
- FAO (1986). Experience of implementing National Forestry Programmes in Nigeria.
- FAO (1999). Forestry and food security, FAO Romepaper, pp.140-147. <http://www.fao.org/docrep/005/ac918e04>.
- FORMECU (1999). Diversity and population of Timber Tree Species Producing Valuable Non-Timber Products in Two Tropical Rainforests in Cross River State, Nigeria. *Journal of Agriculture and Social Sciences* ISSN Print 1813-2235.
- GoWB (2005). *State Forest Report: 2004-05*, Directorate of Forests. Office of the Principal Chief Conservator of Forests, Kolkata.
- ICRAF-WCA/HT (2007). Growing out of Poverty. Tree Cultivation in West and Central Africa for Home Use and Markets T. A. Grant No. 697-ICRAF, funded by International Fund for Agricultural Development Project Completion Report 2004–2007

- Ijeomah, H.M., Eniang, E. A., Halidu, S. K. and Onyenekwe, A.N. (2015). Forms and trends of encroachments in Cross River National Park of Nigeria. *International Journal of Biology*;7 (3):103 -114.
- Jimoh, S.O. and Azeez, I. O. (2002). Prospect of community participation in the management of Shasha forest reserve, Osun state, Nigeria. In: Abu JE, Oni PI, Popoola L (eds) proceeding of the 28th annual conference of forestry association of Nigeria. Forestry and Challenges of Sustainable Livelihood, Akure, pp208-216. Google Scholar
- Keay, R.W.J. (2009). *Trees of Nigeria* Claendon Press, Oxford.
- Ladipo, D.O. (1994). Preliminary survey of post-harvest and marketing constraints of *Chrysophyllum albidum* (African Star Apple) in Nigeria.
- Maurice, D.C. Umar, Y. and Zubairu, E. (2015). Analysis of Factors influencing Fuelwood consumption in some selected Local Government Areas of Taraba state, Nigeria. *Journal of Agricultural Economics, Environmental and Social Sciences*, 1 (1): 163-168.
- Ogigirigi, M.A. (1993). Environmental Amelioration and Conservation through Agroforestry for Sustainable Agriculture in Semi-Arid Eco Zones in Nigeria. *A paper presented at the 29th Annual Conference of the Agricultural Society of Nigeria*. October 31-November, 1993. 1-20Pp.
- Okafor, J.C. (2011). Woody plants of nutritional importance in traditional farming system of the Nigeria humid tropics. Ph.D. Thesis, University of Ibadan.
- Olarinde, L.O., A.O. Ajao and Okunola, S.O. (2008). Determinants of technical efficiency in beekeeping farms in Oyo State, Nigeria. A stochastic frontier approach. *Research Journal of Agriculture and Biological Science*, 4(1): 65 – 69.
- Olagunju, F. I. and Ajetomobi, J.O. (2003). Profitability of honey production under improved method of beekeeping in Oyo state, Nigeria. *International journal of Economic and Development Issues*, 3(I):148-151.
- Omotosho, O.A., Falola, A. and Adebisi, L. O. (2013). Performance of Wild Fruit Marketing in Nigeria: A Case Study of African Star Apple (*Chrysophyllum Albidum*) in Ilorin Metropolis, Kwara State, Nigeria. *African Journal Online. Journal of Agriculture and Food Sciences. Journal Home > Vol 11, No 1 (2013) >*. From <https://www.ajol.info/index.php/jafs/article/view/102488>. 23/02/2018. 3:25 pm
- Onyekwelu, J.C., and Stimm, B. (2011). *Chrysophyllum albidum*. In: Schütt, P.; Weisgerber, H.; Lang, U.; Roloff, A.; Stimm, B. (eds.). *Enzyklopädie der Holzgewächse*, Wiley publishers, 59. Erg.Lfg. 11/11, 12 pp. Munich: Germany.
- Onyekwelu, J. C., Stimm, B., Mosandl, R. and Olusola, J.A. (2011). Domestication of *Chrysophyllum albidum* from Rainforest and Derived Savannah Ecosystems – Phenotype Variation and Selection of Elite Trees. Paper Presented at a Conference on International Research on Food Security, Natural Resource Management and Rural Development (Tropentag), University of Bonn. October 5th – 7th
- Risper, M. Berem (2015). Economic Analysis of honey production and marketing in Baringo County, Kenya: An application of the Institutional Analysis and Development Framework. *Journal of Natural Sciences Research*, 5, 10, 2015.
- Senchi, A.A. and Malami, A.A. (2015). Profitability of non-timber forest products (NTFPs) production and marketing in Zuru local government area, Kebbi state. A case for honey. *International Journal of Sustainable Agriculture Research*, 2, (2): 53-65
- Shiembo, P.N. (1996). Vegetative Propagation of *Irvingia gabonensis*, a West African fruit tree. *Forest Ecology and Management*, 1996-Elsevier.

- Suleiman, M. S., Wasonga, V.O. and Mbau, J. S. (2017). Non-timber forest products and their contribution to households income around Falgore Game Reserve in Kano state, Nigeria. <https://link.springer.com>article.by MS Suleiman,2017>. Retrieved on 16th October 2018 by 2:30pm
- Sokoto Energy Research Center (2012). Usmanu Danfodiyo University, Sokoto. Nigeria
- Taru, V. B. and Ndaghu, A.A. (2013). Evaluation of fuel wood marketing in Adamawa state, Nigeria. *Academic Journals*, 8 (47): 5978-5981
- Ugwu, J.A. and Umeh, V.C. (2015). Assessment of African Star Apple (*Chrysophyllum albidum*) Fruit Damage Due to Insect Pests in Ibadan, Southwest Nigeria. *Research Journal of Forestry*, 9 (3), 87-92
- Ureigho, U.N. and Ekeke, B. (2010). Nutrient Values of *Chrysophyllum Albidum* Linn African Star Apple as a Domestic Income Plantation Species. https://www.researchgate.net/publication/272336189_Nutrient_Values_of_Chrysophyllum_Albidum_Linn_African_Star_Apple_as_a_Domestic_Income_Plantation_Species.
- USAID (2017). Nigeria Population and Development Sokoto State. Factsheet September 2017