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SOCIO-ECONOMIC AND MARKET POTENTIALS OF *CHRYSOPHYLLUM ALBIDUM* IN RAINFOREST AND DERIVED SAVANNA VEGETATION ZONES OF OSUN STATE, NIGERIA

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Abstract

This research to investigated the socio-economic and market potentials of Chrysophyllum albidum for the sustainability of the people, especially the rural dwellers. Nine and fifteen communities were purposely selected from rainforest and derived savanna zones for socio-economic and market potentials assessments, respectively. Two sets of semi-structured questionnaires (Household and Key informant questionnaire) were used to obtain information from the respondents. Majority of the respondents in both vegetation zones were mostly male and they are between the age of 41 to 50 years of age. A high percentage of C. albidum trees in both rainforest (66.7%) and derived savanna (93.3%) are found on the farmland. The result revealed that, 11.1% and 17.3% of the respondents in both rainforest and savanna zones respectively that owned C. albidum either on their farmlands or home gardens had no formal education. C. albidum fruits was being used for various purposes including food, nutritional supplement, income generation, medicinal, etc. Majority of the farmers sells C. albidum fruits by selling the whole tree on farmland for the marketers to harvest the fruits. Annual income generated from the sale of C. albidum fruits was between ₦ 8, 000 to ₦ 150, 000 in both rainforest and derived savanna vegetation zones, respectively. This research paper highlights the socio-economic and market potentials of Chrysophyllum albidum in the two vegetation zones of Osun State.

Key words**:** *socio-economic, market potentials, Chrysophyllum albidum, rainforest and derived savanna*

INTRODUCTION

Chrysophyllum albidum G. Don, commonly known as "Africa star apple" belongs to the Sapotaceae family. It is primarily a forest tree species, native to many parts of tropical Africa, widely distributed in West, Central, and East Africa for its edible fruits and various ethno-medical uses [11]. *C. albidum*, an indigenous plant is known by various tribal names in Nigeria as *agbalumo* (Yoruba), *Udara* (Ibo, Efik and Ibibo), *ehya* (Igala) and *agwaluma* (Hausa) [17]. Its fruits are harvested annually between December and April, which makes it a highly seasonal product [23]. The fleshy fruit pulp is suitable for jams and eaten especially as snack by both young and old [11]. The juice of the fruit has potentials as an ingredient of soft drinks and can be fermented for wine or other alcohol production [9]. *C. albidum* has been found to have nutritive value to provide nutrient supplements for children and women in rural communities [26] and high content of ascorbic acid (between 1,000 to 3,330 mg per 100 gm of edible fruit), which is about 100 times higher than that of oranges and 10 times higher than that of guava or cashew [6]. Commercially, *C. albidum* fruit is highly valued in Ghana and Nigeria and it is an excellent source of vitamins, irons, and raw materials to some manufacturing industries [14]. The market attractiveness of the species is derived from the sweet taste of the fruit pulp [8].

Despite the importance of *C. albidum* and other forest food tree species, their regeneration and improvement have been greatly neglected. *C. albidum* grows in the wild and if continues, there will be low probability of obtaining its much valued fruit on a sustainable basis [15]. In Nigeria, *C. albidum* is classified among the endangered tree species [18], with a high possibility of going into extinction in the near future except something is done to conserve the species or increase their population. The short shelf life of *C. albidum* fruit [14] as well as the lack of

storage facilities poses a serious problem for its marketing. However, marketing of *C. albidum* has the prospect of providing a considerable income generating opportunity for rural people. From December 2005 to February 2006, the price of a basket of the fruits of *Chrysophyllum albidum* in Ghana ranged from about US$7 to US$17 [14]. In the humid lowland of Nigeria, the average value of production for 2007, the fruit of *C. albidum* was estimated at about US$16 million [19]. The general objective of this research is to analyze the socio-economic contributions and market potentials of *Chrysophyllum albidum* in the rainforest and derived savanna vegetation zones of Osun State, Nigeria.

MATERIALS AND METHODS

Study Area

Osun State has a many opportunities for agriculture development [4, 12, 22], but also for using other natural resources like the tropical rainforest and derived savanna zones [15].

The study was conducted in tropical rainforest and derived savanna vegetation zones of Osun State, Nigeria. From each vegetation zone, three LGAs (Atakumosa West, Ife North and Isokan) from tropical rainforest and five LGAs (Boripe, Iwo, Ejigbo, Ede North, Odo-Otin) from derived savanna were purposively selected and three communities with good concentration of *C. albidum* were purposively selected from each of the LGA. In each of the communities, five farming households who have *C. albidum* especially on their farms and home gardens were selected through snowball sampling technique. In addition, one key informant (farmer) was interviewed in each of the communities to gather information on the marketing. The GPS reading of the selected communities were overlaid to generated maps that show the distribution of the communities as shown in Figures 1 using QGIS software.

Data Collection

Data for this study were collected using two sets of semi-structured questionnaires. The first category of questionnaire (Household questionnaire), which was used to gather information (e.g. annual income from the sale of the fruits, percentage contribution of *C. albidum* to total annual income, yield of *C. albidum* per annum). The second set of questionnaire (Key informant questionnaire) was used to obtain data on fruit price (both at the market and farm gate), where the marketing takes place and people that are involved etc. The questionnaire was pre-tested before final administration to respondents. Thus, a total of 120 respondents were interviewed across the two vegetation zones in Osun State, Nigeria. The data were subsequently analyzed using descriptive statistics.

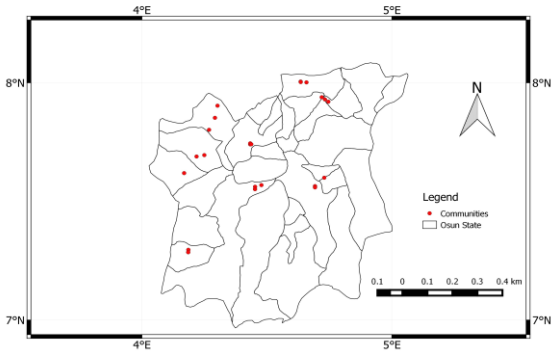

Fig. 1. Distribution of communities visited (red dots)
Source: Data Analysis.

RESULTS AND DISCUSSIONS

The research work covered a total of 24 communities. The results obtained in this study show that people that have *C. albidum* either on their farmlands or homes are mostly males, which is to be expected since the majority of respondents are males. They are married and their age ranged between 41 and 50 years (Table 1). This age range is active and will thus ensure active labour force for the domestication of the species as confirmed with the findings of Bolanle-Ojo and Onyekwelu [15], and their major occupation is farming, in both vegetation zones. The high percentage of middle aged (i.e. working-age adults) found in the two vegetation zones is an indication that they have high tendency to generate higher income from the sales of fruits, which is also similar to the view of Ajibefun *et. al.* [10].

The result (Table 1) revealed that, 11.1% and 17.3% of the respondents in both rainforest and savanna zones respectively that owned *C. albidum* either on their farmlands or home gardens had no formal education. Thus, respondents with no formal education are higher in the savanna than in rainforest ecosystem. In the rainforest zone, majority of the respondents have up to secondary school education (46.7%). The higher educational level of the respondents in the rainforest zone might have contributed to higher domestication level for the improvement on the production of *C. albidum* in the ecosystem. The low educational status observed among the farming populace is supported by earlier studies such as Adams *et. al.* [1] and Adhikari, *et. al.*[5]. Stoian [24] opined that education is one of the important human capitals, which plays important role in determining status in the society. Education is expected to contribute to people's ability to read and understand instructions and hence help them to adopt new technologies [16]. Prominent level of illiteracy in the savanna zone can lead to deforestation of the forest resources as it was noted by Adekunle *et. al.*, [3], which is the major threat factor of the species in the savanna ecosystem. Educational level may also affect future domestication of the forest fruit tree species, this is because it is easier to create awareness among educated people than among the non-educated [15].

Table 1. Demographic Information of Respondents

	Variants	**Rainforest (n=45)**		**Savanna (n=75)**	
		F	%	F	%
Age of Respondents	20-30 years	3	2.2	7	9.3
	31-40 years	10	22.1	13	17.3
	41-50 years	16	35.4	24	33.3
	51-60 years	15	33.1	17	22.6
	61-70 years	1	2.2	5	6.6
	71-80 years	0	0	7	9.2
	81-90 years	0	0	1	1.3
Highest Education Attained	No Formal Education	5	11.1	13	17.3
	Primary Education	18	40	46	61.3
	Secondary Education	21	46.5	15	20
	Tertiary Education	1	2.2	1	1.3

Source: Data Analysis.

The results on Figure 2 show that in both rainforest and derived savanna zones most of *C. albidum* trees are located on the farmlands. None of the respondents had been deliberately involved in planting of *C. albidum* trees.
Dominant reasons by the respondents for not planting the tree was the belief that if *C. albidum* tree is planted, they might experience early or immature death. The result on Figure 3 highlights the multipurpose uses of *Chrysophyllum albidum* in the study area.
The use categories of *C. albidum* in the study area were food, income and medicine. Food and medicine emerged as most dominant use categories among the respondents in both rainforest and savanna part of the study area.

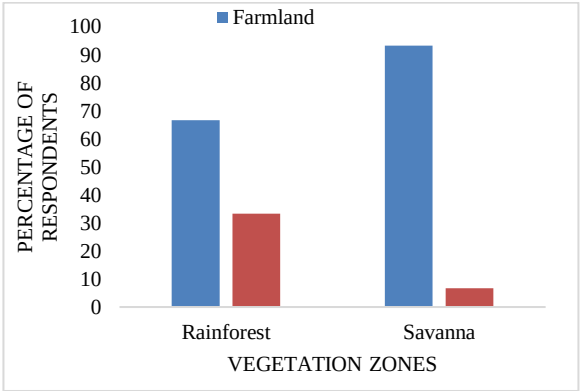

Fig. 2. Locations of *Chrysophyllum albidum* trees
Source: Data Analysis.

These findings confirmed previous studies that reported on the rich and diverse array of uses of *C. albidum* trees [7]. Besides these common uses, it was also mentioned by Houessou *et.al.*, [20], that *C. albidum* leaves

were occasionally used for fodder and rotten or damaged fruits were used to feed pigs.

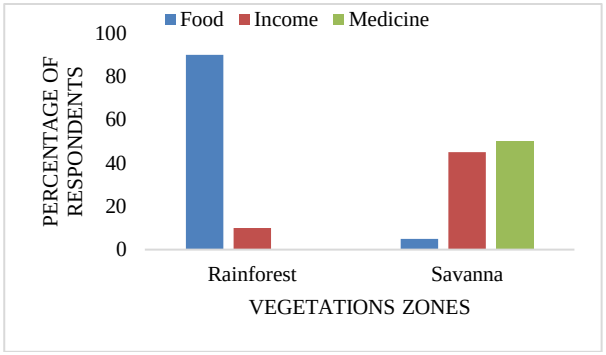

Fig. 3. Uses categories of *C. albidum*
Source: Data Analysis.

The number of trees owned by respondents across the vegetation zones is presented in Figure 4, In the rainforest zone, majority of the respondents (51.1%) had two trees of *C. albidum*, 37.8% had only one tree, 8.9% had three trees and 2.2% had four trees of *C. albidum*. Majority of the respondents (48%) in the derived savanna zone, had only one tree of *C. albidum*, 33.3% had two trees, 10.7% had three trees, 2.7% had five trees, 2.7% had six trees, 1.3% had eight trees, and 1.3% had ten trees.

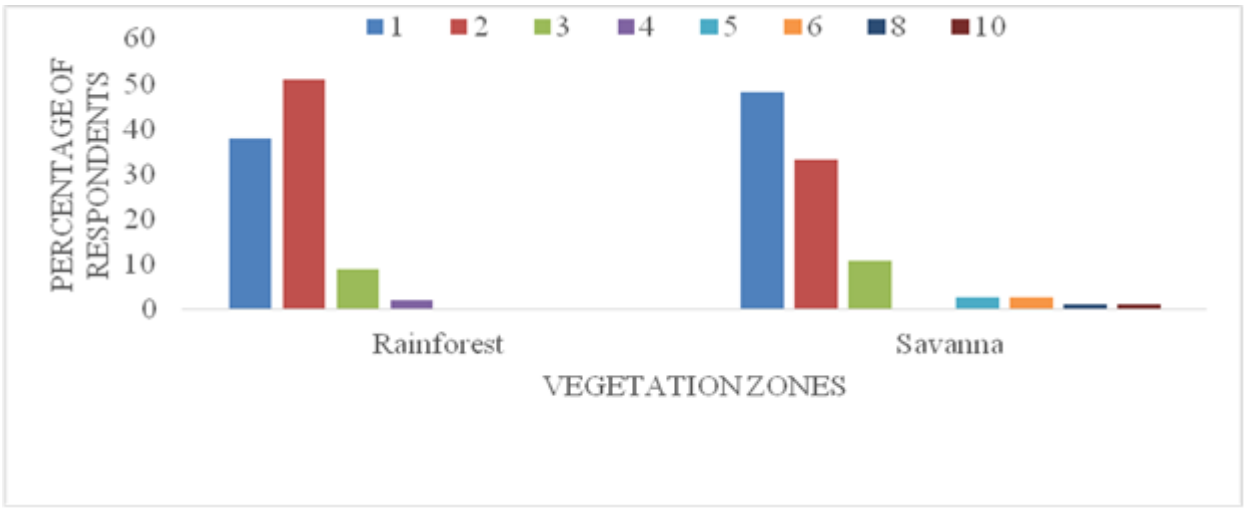

Fig. 4. Number of *C. albidum* trees owned by respondents in the study area
Source: Data Analysis.

The result obtained in this study show that all the respondents (100%) in both vegetation zones retained *C. albidum* tree, either on their farmlands and/or in their home gardens. Figure 5 shows that in the rainforest zone, majority of the respondents (57.8%) retained *C. albidum* tree for the purpose of food security and income, 40% retained *C. albidum* tree for food security, and only 2.2% retained *C. albidum* tree for food security, income and medicinal purposes. This shows that the people in the in rainforest zone have poor knowledge about the medicinal value of *C. albidum*. However, in the derived savanna zone, 2.7% of the respondents retained *C. albidum* tree for food security, 6.6% for income generation and 52% for medicinal, income, and food security purposes, and 38.7% for food security and income generation. In the rainforest zone, majority of the respondents (88.9%) sell the fruits while on the tree on farmland and the traders harvests the fruits thereafter while 11.1% periodically harvest the fruits from the trees and sell. All the respondents (100%) in the savanna sells the fruits by selling the entire fruits on the tree (Figure 6).

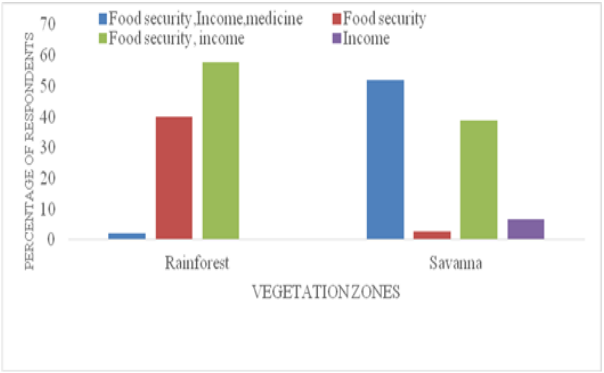

Fig. 5. Respondents reasons for retaining *C. albidum*
Source: Data Analysis.

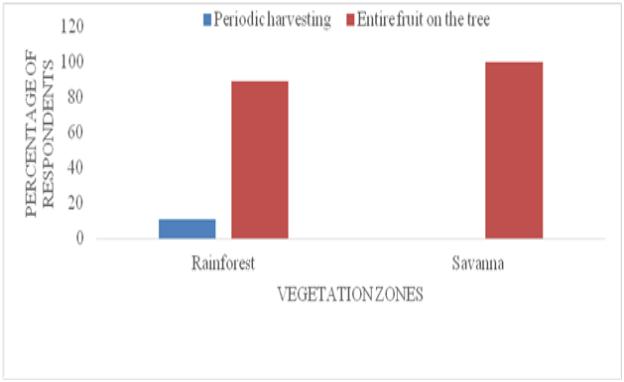

Fig. 6. Methods of sales of *C. albidum*
Source: Data Analysis.

Result in Table 2 study show that in the rainforest zone, majority (88.9%) of the respondents claimed that the cost/basket of *C. albidum* fruits at the farm gate ranged from ₦1,500 - ₦2,000 and 11.1% claimed that it was ₦1, 500 - ₦1,800 while 100% of the respondents claimed that at the market was ₦1,500 - ₦2,000. In the derived savanna zone, majority of the respondents (53.3%) and 46.7% claimed that the cost/basket of *C. albidum* fruits at the farm gate ranged from ₦1,500 - ₦2,000 *and* ₦1, 500 - ₦1,800 respectively.

Table 2. Cost of *C. albidum* fruits in rainforest and derived savanna zones

	Rainforest		**Derived Savanna**	
	Farmgate (%)	Market (%)	Farmgate (%)	Market (%)
₦ 1,500 - ₦ 1,800	11.1	0.0	46.7	0.0
₦ 1,500 - ₦ 2,000	88.9	100	53.3	93.4
₦ 1,500 - ₦ 2,500	0.0	0.0	0.0	6.6

Source: Data Analysis.

At the market, majority of the respondents (93.40%), 6.6% claimed that the cost/basket of *C. albidum* fruits ranged from ₦1,500 - ₦2,000, and ₦1,500 - ₦2,500 respectively.

The result in Figure 7 show the annual income generated by the respondents. Annual income generated from sale of *C. albidum* fruits ranged from ₦ 5,000 to ₦ 150,000 in the rainforest vegetation zone and ₦ 8,000 to ₦ 100,000 in the savanna vegetation zone. Generally, higher income was generated from the sale of the species by the marketers in rainforest marketers than derived savanna marketers as indicated in Figure 8. For example, majority of respondents (15.6%) in the rainforest zone realized ₦30,000 while only 2.2% of the respondents realized ₦150,000. In the derived savanna, majority of respondents (29.3%) earned ₦10,000 while 1.3% of the respondents realized ₦85,000. The mean annual income realized from the sales of *C. albidum* fruits were ₦22,955.56 and ₦21,813.33 for the rainforest and derived savanna zones respectively. Based on the fact that a high percentage of traders generated high annual income from the sale of the fruits, it can be opined that marketing of the fruits is rewarding business. Some other studies conducted in various parts of the world demonstrated that households utilize forest fruits due to their great subsistence role and cash income generation potentials [21]. The high annual income recorded in this study is supported by the study conducted in Kwara and Ekiti States by Adedayo [2] and Bada [13], who reported that large number of rural dwellers in Kwara and Ekiti States earn over N200,000.00 per annum from non-timber forest products marketing. Some researchers [25] have shown that NTFPs could contribute between 25 and 70% to rural household income.

The result in Figure 8 shows the percentage contribution of *C. albidum* to respondent's total annual income. Result shows that, majority of the respondents (97.8%) claimed that *C. albidum* contributes less than 20% to their total annual income and the remaining 2.2%, of the respondents claimed that *C. albidum* contributes 20-40%.

All the respondents (100%) in the derived savanna claimed that, *C. albidum* contributes less than 20% to their total annual income.

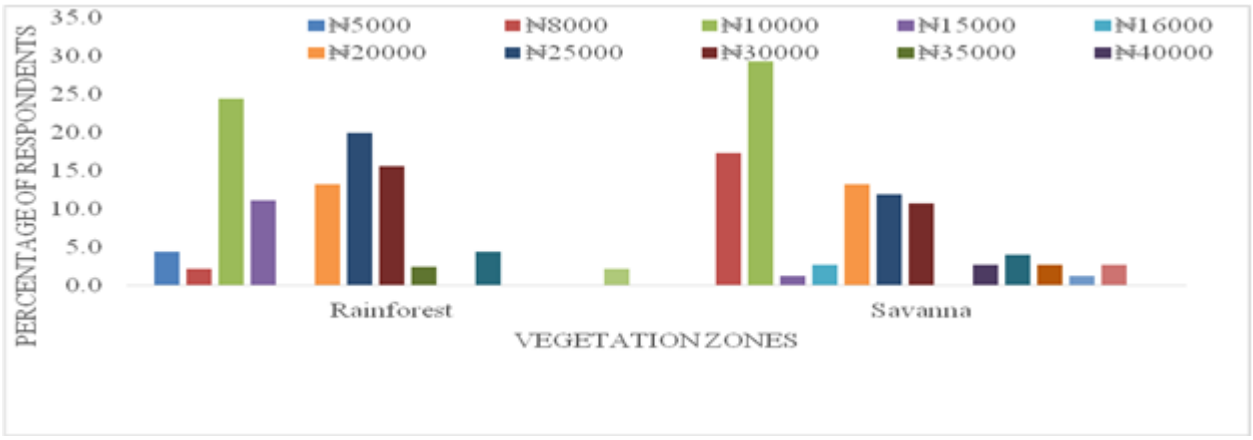

Fig. 7. Annual Income from the Sales of *C. albidum* fruits
Source: Data Analysis.

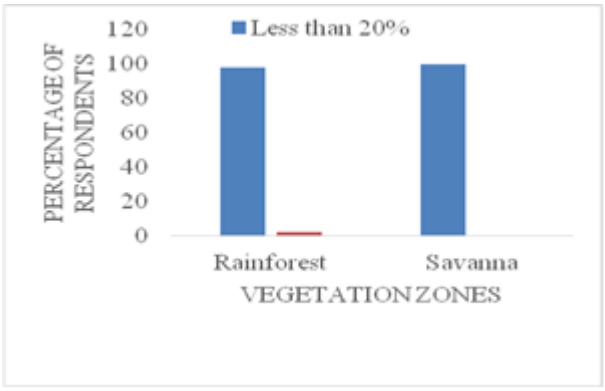

Fig. 8 Percentage contribution of *C. albidum* to the total annual income of the respondents
Source: Data Analysis.

CONCLUSIONS

Chrysophyllum albidum is a multipurpose tree species, which economically important to the two vegetation zones and thus contributes greatly to the socio-economic and sustain the life of the people in Osun State through the production, collection and marketing of its fruits. The people depend on them for medicinal, food and economic purposes which contribute to improve health, nutrition, food security and income to the local communities. Thus, it can serve as an alternative source of food during low production of agricultural products (such as fruits) and source of employment to generate income for unemployed people especially in the rural areas. However, farmers are willing to have more of this multipurpose tree species because it is economically viable, socially accepted, and environmentally sound when planted. There are indications that, there is a great demand for sweeter and bigger sized fruit and this can be done through tree improvement programme. Full domestication of this valuable fruit tree would be more beneficial and as a companion fruit for perennial crops in Agroforestry system which could have significant effects on food security and income generation by small scale farmers in Nigeria. Consequently, there is need for domestication of *C. albidum* in the study area. Also, there should provision storage facilities to preserve the fruit from wastage and to generated higher income, especially during offseason period.

In addition, *C. albidum* is threatened by logging and deforestation in the study area when visited. Therefore, it is important to develop sustainable strategies for its conservation.

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