SURVEY OF THE PRODUCTION OF AFRICAN STAR APPLE IN OSUN STATE

Odeyinka, S. M., *Abegunde, T. O., Olosunde, A. O., Aborisade, E. O., Gbenjo, C. O. and Yinusa, M. D.

Department of Animal Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria
*Corresponding author: tayeabegunde2@yahoo.com

ABSTRACT
A survey was conducted to assess the significant yet underexplored production of African Star Apple (Chrysophyllum albidum) in Osun State, Nigeria and the potential utilization of its leaves as feed for goats. Despite its economic and nutritional importance, particularly in rural communities, there is limited knowledge regarding the production practices and challenges faced by local farmers. The study employed a mixed-method approach, including the administration of structured questionnaires to 100 respondents, to assess the current status, cultivation methods, and potential uses of African Star Apple. A preference study was also conducted to assess its potential as feed for goats. Key findings reveal that African Star Apple production is predominantly supported by traditional farming practices, with significant variability in yield and profitability influenced by factors such as seasonal availability, pest infestations, and limited access to modern agricultural resources. Results showed that majority of participants are aged between 30 and 50 years (31.58%). Gender distribution showed a female majority, with 73.74% women and 26.26% men. Preference studies showed that C. albidum leaves were well relished by goats with a coefficient of preference value of 1.06 when fed along with Gliricidia Sepium (1.25) and Moringa oleifera leaves (0.69). The study concludes that optimizing production through improved agricultural techniques, better pest management, and enhanced market access is crucial for increasing the productivity and profitability of African Star Apple farming, while also promoting its use in livestock feeding to contribute to the broader goals of food security and poverty reduction in the region.
Keywords: African Star Apple, *Chrysophyllum albidum,* Production, Osun State, Coefficient of Preference

INTRODUCTION

African Star Apple (*Chrysophyllum albidum*), known as "Agbalumo" in Southwest Nigeria, holds economic significance in Osun State. This fruit tree not only enriches biodiversity but also plays a vital role in local livelihoods. With its nutritional value and economic benefits, African Star Apple contributes to food security and income generation for farmers. Understanding its cultivation practices will contribute positively in enhancing productivity and sustainability, guiding policy decisions and agricultural interventions for optimal production outcomes. Non-wood forest products (NWFPs) are vital for the livelihood of Nigerians, as a single plant species can serve multiple purposes across different locations and ecological zones (Lovric *et al*., 2020; Omotayo and Aremu, 2020). These products provide essential resources such as food for humans and animals, medicinal compounds to combat various diseases, and natural food colours and spices that enhance the flavour and market appeal of food (Bhargava and Bansal, 2021). Globally, many people cannot afford to include both dairy and meat in their daily diet and instead rely heavily on plant products for their calorie and protein needs. It is estimated that plants supply 88 percent of the calories (carbohydrates and fats) and 80 percent of the proteins consumed by humans, with the remainder coming from animal products (Dadegnon *et al*., 2015). Given these numerous benefits, the study of the production and contribution of *Chrysophyllum albidum* to livelihood remains significant. African Star apples in the South Western part of Nigeria are common plant found growing in the wild and cultivated in the southern part of Nigeria. It is a wild tropical tree belonging to the Sapotacae family. It can be found in diverse eco-zones in Nigeria and in other tropical African countries such as Uganda, Niger Republic, Cameroon and Cote d'Ivoire (Ogunleye *et al*., 2020). The fruit is mostly cultivated in the rural areas and is very common during the months of December to April. It has good flavour and it is a good source of vitamins C (more than oranges/guava), minerals, calcium, iron and fiber (Chukwumalume *et al*., 2010).

Despite the significant nutritional and economic contributions of African Star Apple (*Chrysophyllum albidum*) to communities in Nigeria, particularly in Osun State, there exists a lack of comprehensive research focusing on optimizing its production practices, addressing the challenges faced by farmers and assessment of potential of the leaves in feeding goats. This knowledge gap hinders the development of effective policies and agricultural practices that could enhance productivity, sustainability, utilization and profitability of African Star Apple cultivation. This study seeks to fill this knowledge gap by providing comprehensive data on the production practices and constraints of African Star Apple cultivation in Osun State. The findings will inform policy recommendations and agricultural practices that can enhance productivity, sustainability, and profitability, ultimately benefiting the local economy and improving the well-being of the farmers, consumers and their livestock.

MATERIALS AND METHODS

Experimental Location

The study was conducted in Osun State within the geographical location of 4°06' 9" East longitude and 7°50' 0" North latitude. The data for the study were collected from the following towns within the state: Ila Orangun, Gbongan, Ilesa, Ikirun, Ikire, Ipetumodu, Aba-gboro, Modakeke, Ife Central, Ede, and Ipetu Ijesa

Data Collection and Sampling techniques

Primary data was used in this study. Primary data was collected through the administration of a structured questionnaire to the respondents. Multi-stage sampling technique was used in selecting the respondents which comprised of both farmers and sellers of African Star Apple. A total of hundred (100) African star apple marketers and farmers were selected to form the sample size for the study. Gbongan and Ikire markets in Osun state were purposively selected being the two prominent fruits markets with high trading activities.

Data Analysis

Descriptive statistical tools, such as frequency distributions and percentages, were used to assess the current status of African star apple production in Osun State. Descriptive statistics and thematic analysis were used to investigate the cultivation methods used by farmers.

Acceptability Trials

The freshly cut leaves of the forages (*C. albidum*, *G. sepium* and *M. oleifera*) and water were offered to the experimental animals using a cafeteria method, thus permitting free access to the forages of their choice. The forages were offered to the animals for 6 hours daily for a period of 7 days after the adaptation period of the WAD goats. Approximately 1.5-1.8kg each of the forages were weighed and hung in each of the partitioned wooden feeding troughs daily, the difference between the initial forage weight and the leftover weight (on as-fed-basis) following the withdrawals was taken as the daily intake of the individual animals. After withdrawal of the leaves, the animals were placed on *Panicum maximum* and concentrate feeds till the following morning.

RESULTS AND DISCUSSION

Socio-economic Status of Respondents

The socio-economic status of the respondents is shown in Table 1. The result showed that majority of participants are aged between 30 and 50 years, with 31.58% of individuals in the 30-40 age range and 32.63% in the 40-50 range. This indicates that the sector is largely supported by middle-aged individuals. A relatively small proportion of the respondents are older than 60 years, with only 2.1% of individuals reported in this age group, suggesting that older individuals are less engaged in ASA-related activities. In terms of education, most respondents (75.34%) had SSCE (Senior Secondary Certificate Examination) level of education. 15.07% of the respondents possessed a Bachelor of Science degree (BSc), while 9.59% had no formal education. This distribution highlights that the sector is predominantly occupied by individuals with basic educational qualifications, which may influence the practices and innovations they employ in their work. Gender distribution among the respondents shows a clear female majority, with 73.74% women compared to 26.26% men. This gender disparity suggests that women play a significant role in the cultivation, trading, and other activities related to ASA. Findings from a study financed by the United Nations Development Programme (UNDP) revealed that women make up some 60 to 80% of the agricultural labour force in Nigeria (World Bank, 2003), depending on the region and they produce two-thirds of the food crops (Mohammed and Abdulquari, 2012). In terms of the occupations, majority are traders (71%), with farmers comprising the remaining 29%. This suggests a strong market orientation among the participants, with trading activities potentially driving the economic dynamics of the ASA sector. The respondents had varied levels of experience in the business, with the most common range being (32.65%) 10-20 years, while (4.08%) have been in business for 40-50 years, which may reflect the challenges of maintaining long-term engagement in this sector or possibly indicate a trend of newer entrants into the market. Additionally, the size of the farms operated by these respondents varies widely, with some working on small plots, such as 6 acres (4.17%), while others manage large tracts of land measured in hectares. The diversity in farm size may reflect the varying scales of operation and resource availability among the respondents. When considering the source of ASA, the data shows that the majority (71.25%) of respondents purchased the fruit rather than cultivating it. Only 28.74% of respondents rely on personal cultivation. This suggests a heavy reliance on market transactions for access to ASA, which could have implications for the sustainability and profitability of the sector.

Farming Techniques and Cultivation Practices

The farming techniques and cultivation practices employed by respondents are shown in Table 2. The table shows the methods used in the production of African Star Apple (ASA). The result indicates that 67.86% of the respondents adopted conventional farming techniques and cultivation

Table 1: Socio-economic Characteristics of Respondents in the African Star Apple Production Survey, Osun State, Nigeria"

Characteristics	Frequency	Percentage (%)
Age		
20-30	10	10.53
30-40	30	31.58
40-50	31	32.63
50-60	22	23.16
60 above	1	1.05
70 above	1	1.05
Educational Level		
BSc	11	15.07
SSCE	55	75.34
No Formal Education	7	9.59
Gender		
Male	26	26.26
Female	73	73.74
Occupation		
Farmer	29	29
Trader	71	71
Year in Business		
1-5	13	13.27
5-10	26	26.53
10-20	32	32.65
20-30	23	23.47
40-50	4	4.08
Size of Farm		
20 acres	2	8.33
6 acres	1	4.17
Acres	12	50
Hectares	7	29.17
Scattered Farm Land		
Source of African Star Apple		
Personal Cultivation	25	28.64
Purchase	62	71.26

17.85% adopted organic farming method, reflecting a small but significant interest in environmentally friendly and sustainable farming practices. Additionally, 3.57% of respondents utilize a combination of organic and conventional methods, indicating a blended approach to cultivation. In terms of yield, the majority of respondents produced between 10-20 baskets of ASA per year, as reported by 54.29% of individuals. Only a few respondents manage to exceed 30 baskets annually, which suggests that the yields are generally modest and may be influenced by various factors such as farm size, farming techniques, and environmental conditions. The profitability of ASA cultivation also varies widely among the respondents. While most earned between ₦11,000-20,000 per basket, 14.29% of individuals report higher earnings, with 2.04% of respondents making over ₦100,000 annually. This variation in income highlights the different levels of success and profitability within the sector. The availability of ASA is another critical factor reported by the respondents. A significant number, 54.25% of respondents, reported that the fruits as "very available," indicating a strong presence in the market. However, availability is not uniform, as some respondents find ASA to be "less available" (4.26%) or "not readily available" (3.19%). This inconsistency in availability could be due to seasonal factors, supply chain issues, or localized shortages. The duration of ASA availability typically lasts for about 3 months, as reported by 35.48% of respondents, though some noted availability for longer periods, such as 4-5 months 32.26%. This seasonal availability may impact market dynamics, pricing and overall profitability for those involved in the ASA trade.

Table 2: Farming Techniques, Cultivation Practices, Yield, Profitability, and Availability of African Star Apple Production in Osun State, Nigeria"

Characteristics	Frequency	Percentage (%)
Farming Techniques and Cultivation		
Conventional	10	67.86
Manure, Regular weeding	1	3.57
Organic	5	17.85
Organic, conventional	1	3.57
Seeds	2	7.14
70 above		
Yield in Year per basket		
1-9	9	25.71
10-20	19	54.29
21-30	3	8.57
31-40	1	2.86
41-50	1	2.86
51-60	1	2.86
61-70	1	2.86
Annual Profit (₦) per basket		
1,000-10,000	9	18.37
11,000-20,000	17	34.69
21,000-30,000	9	18.37
31,000-40,000	2	4.08
41,000-50,000	1	2.04
51.000-60,000	1	2.04
61,000-70,000	0	0
71.000-80,000	1	2.04
81,000-90,000	1	2.04
91.000-100,000	1	2.04
Above 100,000	7	14.29
Availability		
Available	27	28.72
Less available	4	2.26
Not readily available	3	3.19
Quite available	1	1.06
Slightly available	8	8.51
Very available	51	54.25
Duration of Availability (months)		
2-3	12	13.01
3	33	35.48
3-4	11	11.83
4-5	30	32.26
6-7	6	6.45
8 and above	1	1.08

Table 3 shows the acceptability of different forages by WAD goats. The Mean Dry Matter Intake (MDMI) obtained for *Gliricidia sepium* leaves was higher than those of *Chrysophyllum albidum* and *Moringa oleifera* leaves. The forage preference on a cafeteria basis revealed that *Gliricidia sepium* leaves were the most preferred with a CoP of 1.249, followed by leaves of *Chrysophyllum albidum*, with a CoP of 1.058 and *Moringa oleifera* leaves with the CoP of 0.693. The CoP values for *Moringa oleifera* fell below unity (1.0) and as such they are regarded as 'rejected' by WAD goats.

Table 3: Acceptability of different forage leaves by West African Dwarf (WAD) goats

Diets	MDMI (KgDM)	CoP	Rank
African Star Apple leaves	0.888	1.058	2nd
Gliricidia sepium leaves	1.048	1.249	1st
Moringa oleifera leaves	0.588	0.693	3rd

MDMI = Mean Dry Matter Intake; **CoP = Coefficient of Preference;**

CONCLUSION

This study concludes that women are predominantly involved in the cultivation and trade of African Star Apple, highlighting their crucial role in this agricultural sector. Age distribution of participants showed that the majority were middle-aged, indicating that the sector is largely supported by individuals in their most productive years and production levels are influenced by several factors, including seasonal availability, cultivation techniques, and market demand, which affect the overall yield and profitability of African Star Apple production. *C. albidum* is well-relished by goats.

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