

Productivity Constraints of Smallholder Palm Oil Processors/Millers in Edo State, Nigeria

Ben Asuelimen, IJIE, PhD
UNHCR, Abuja 900231, FCT, Nigeria
Department of Public Administration,
Faculty of Management Sciences, Ambrose Alli University,
Ekpoma

Sunday Osemekhian, ORIAIFO, PhD
Farm Unit, Ambrose Alli University, Ekpoma.
Department of Soil Science,
Faculty of Agriculture, Ambrose Alli University,
Ekpoma

Micheal Omohimi, IYIORIOBHE, PhD
Uromi Justice Development Peace and Caritas Initiatives,
Chancery Complex, Uromi Edo State. Department of Public Administration,
Faculty of Management Sciences, Ambrose Alli University, Ekpoma

Abstract:- The study examined specific issues relating to palm oil processing enterprises in Edo State. Using rapid rural appraisal, data were collected from palm oil processors/millers, supplemented with individual and group interviews with palm oil milling equipment fabricators. The respondents of the study were sampled from the three agro-ecological zones in the State, specifically, from three local governments (LGs) in Edo north zone, four LGs in Edo central zone and five LGs in Edo south zone. Data collected using the validated questionnaires were analysed using frequency, mean and graphs. Qualitative responses obtained from interview sessions i.e., FGDs and key informant interviews were used to elaborate on the quantitative data obtained. The study's key findings are that most mill owners were male (67.3%) while the majority of mill users were female (63.6%). The prevalent milling equipment used by the respondents was the traditional mill i.e. vertical digester+manual screw press (90.9%), which was largely sourced from local fabricators (56.3%). The use of this equipment is plagued with several challenges: In addition to the low yield of palm oil, is the constant breakdown and high maintenance cost. The paper recommends the promotion of awareness of NIFOR SSPE among millers through sponsored seminars, practical demonstrations of the SSPE and increased access to funds through the formation of groups and linking them to credit institutions.

Keywords:- processors/millers, finance, productivity, constraints.

I. INTRODUCTION

The collapse of crude oil prices in the international market has put a serious strain on the Nigerian economy. Crude oil per barrel that used to go for between \$90-\$100 in 2014 now goes for less than \$30/barrel as of June 2020. This has placed the Nigerian government in an uncertain and precarious situation. Many now believe that the future of the country is bleak since over 90% of her revenue was, before now, derived from crude oil export. It is now evident that the Nigerian economy can no longer survive and depend majorly on crude oil exploration and export. This has forced the government of the day to explore other means of generating revenue. Agriculture still remains one way of

tackling the economic challenge facing the country right now. The sector has the potential to boost the economy since it employs millions of people. Available statistics show that 80% of production comes from several million smallholders spread across an estimated area starting from 1.65 million hectares to a maximum of three million hectares. For many Nigerians, palm oil production is a component of their way of life –indeed it's a part of their culture (WRM, 2010, PIND, 2011).

The oil palm sub-sector of the Nigerian agricultural economy is a potential productive sector that could aid the diversification of and boost the economy. Oil palm (*Elaeis guineensis*) is one of the most important economic oil crops in Nigeria. This sub-sector employs millions of Nigerians across 24 or more oil palm growing states (which includes all nine states of the Niger Delta namely Akwa Ibom, Abia, Rivers, Edo, Imo, Ondo, Bayelsa, Cross River and Delta), who are engaged in the production of the crop as well as its processing and marketing (Adebo, Ayodele and Olowokere, 2015).

The oil palm sector was once an important component of the agricultural sector, with Nigeria being the leading producer of palm oil. However, all this is now history since the country, as a result of poor management, neglect of the agricultural sector, and over-dependent on crude oil exports, is now a net importer of palm oil. Nigeria has enormous potential to increase its production of palm oil, but this will require the application of improved production and processing techniques. However, a major challenge faced by producers and processors are the availability of these technologies and the competency and capital required to utilize them effectively. The challenge noted to be militating against the substantial development of the palm oil industry has been the availability and affordability of milling equipment. The traditional processing equipment, used by most millers, are largely inefficient and results in the production of low-quality palm oil. Studies are required to identify the specific productivity constraints faced by processors/millers in the study area with a view to proffering solutions.

Transformation of the oil palm industry, therefore, would require intervention both at the production and processing phases. It is this realization that informed this paper's intervention in the palm oil processing/milling sectors.

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Among several challenges faced by the Nigerian agricultural sector, emerging studies (World Bank, 2013; FAO, 2014; Shittu, 2017; FMARD, 2016) indicate two key challenges. One is an inability to satisfy domestic food requirements, and the inability to export at the quality levels required for market success. The previous problem may be a productivity challenge driven by an input system and farming model that's largely inefficient (Lokpobiri, 2019). As a result, an ageing population of farmers don't have enough seeds, fertilizers, irrigation, crop protection and related support to achieve success (Carbaugh, 2009). The latter challenge is driven by an equally inefficient system for setting and enforcing food quality standards, a gap in processing technologies, as well as poor knowledge of target markets (FMARD, 2016).

To address this lacuna, the vision of the present Agricultural Promotion Policy (APP) is to work with key stakeholders to develop end-to-end value chain solutions and build an agribusiness economy capable of delivering sustained prosperity by meeting domestic food security goals, generating exports, and supporting sustainable income and job growth (FMARD, 2016). It is against this background that the agricultural promotion policy identified the oil palm as a prime commodity among others that hold this huge pro-poor economic growth opportunities for achieving the four key priority goals of the policy which are: food security; import substitution; job creation; and economic diversification (Lokpobiri, 2019).

Oil palm no doubt originated from West Africa of which Nigeria was once a leading producer, (Zeven, 1965; Agboola, 1979). Although Nigeria has huge oil palm production capabilities, PIND (2011), CBN (2015) and FMARD (2016) report that Nigeria still imports between 400,000MT and 600,000MT of the product from foreign markets to meet local demand. The vast economic activities around the value chains of oil palm production and palm oil processing, especially its potential to create jobs, alleviate poverty, earn foreign exchange and diversify the economy is lost to the unfavourable agricultural development policies and outright neglect of the agriculture sector since the oil boom., Emokaro and Ugbekile (2014) while analysing the economy of oil palm processing in Ovia North East and Ikpoba-Okha LGA in Edo State attributed to the poor rural and agricultural developmental policies implementation in Nigeria, especially the huge gap in production and processing technologies.

To explain economic growth and poverty reduction opportunities inherent in the production of oil palm and palm oil processing activities, the study adopted the combined value chains development (VCD) approach advanced by the United State Agency for International Development (USAID) and market systems development (i.e. making market work for the poor (M4P)). While the former is based largely on Michael Porter's value chain analysis theory and the latter on Douglas C. North's institutions and economic growth theory. The approach promoted by the UK Department for International Development (DFID) underpins how from input suppliers to end-users, stakeholders along the value chains of oil palm production and palm oil processing can be strengthened to meet market demand. This is achieved by reducing productivity and growth constraints, increasing access to high-quality inputs and working capital and improving the flow of information. The model is very suitable for utilizing the abundant economic growth opportunities in oil palm production and palm oil processing for achieving the four key priority goals of the agriculture promotion policy-food security; import substitution; job creation; and economic diversification.

A. Palm Oil Production and Nigeria's Economic Growth Potentials

Economic growth and prosperity are central to long-term poverty alleviation for social and environmental sustainability (Food and Agriculture Organisation (FAO), 2002). A study by the Partnership Initiative for the Niger Delta (PIND, 2011) reveals that palm oil production epitomizes one of the most efficient avenues for poverty alleviation, food security and guaranteeing economic stability in Nigeria. With an appropriate focus on the production of commodities with large marketable values, the expansion of oil palm production and palm oil processing can effectively reduce the level of poverty in Nigeria and, in particular, in the Niger Delta region, which includes the Edo State (PIND, 2011). It is against this background, that the Edo State Government under Governor Godwin Obaseki said the State has earmarked 200,000 hectares of land for the cultivation of new oil palm plantations as a way of diversifying the local economy of Edo State, achieving increased job creation and poverty reduction (Okogba, 2018).

The once-thriving palm oil industry in Nigeria is often referred to as one of Africa's most miserably failed economic opportunities (Osolor, 2012). From hitherto being the leading producer of palm oil, Nigeria has now become a net importer of crude palm oil. Domestic palm oil production in Nigeria totalled 850,000 MT in 2012 (PIND 2011). The use of palm oil in Nigeria aggregates to one million MT every year. Official figures reveal that the shortage of palm oil consumption is estimated at 150,000 MT annually (PIND, 2011). Over 42 countries around the world are involved in the production of oil palm, with South- East Asia, such as Indonesia, Malaysia and Thailand, contributing as much as 85 percent - 90 percent of the world's production (Gunn, 2014).

From the 1950s to the mid-1960s, Nigeria was rated as the biggest producer of palm oil globally; it had a market share of 43 percent, supplying 645,000 MT of palm oil, on annual basis, across the globe (Gunn, 2014). However, things have changed as according to Aladewolu (2016), based on the estimation of analysts, the major importers of crude palm oil (CPO); Nigeria and Benin Republic, import 450,000 MT and 470,000 MT of palm oil per annum respectively. Further analysis revealed that most of Benin Republic's palm oil imports actually find their way into Nigeria as the country exports up to 390,000 MT of palm oil annually (Aladewolu, 2016). Thus, the actual shortage of CPO in Nigeria could be as high as 540,000 MT if the exports of Benin Republic are taken into consideration (Aladewolu, 2016).

The fundamental flaw with the Nigeria palm oil sector lies in Nigeria's colonial origins when British trade policies determined Nigeria's economic policy, PIND (2011) stated. Due to Britain's primary export orientation policies at the time, the planned expansion of the oil palm industry was slow. This consequently undermined and compromised the competitiveness of the sub-sector (Mgbakor, Ugwu and Frank, 2013). As a result, the bulk of Nigerian palm oil comes from scattered and semi-wild forests, where actors in the production process utilize profoundly obsolete manual processing procedures for extraction with very minimal output. This finding agrees with Soyebó, Farinde, and Dionco-Adetayo, (2005), which state that 80 percent of production comes from scattered smallholdings spread over an estimated 1.6 million hectares of land. In contrast, plantations occupy only about 300,000 hectares – most of it coming up over the last decade with private sector investment (PIND, 2011).

It is against this background that Ayokhai and Naankiel (2016) posit that several attempts to establish large-scale plantations have ended in miserable failure since the 1960s. They mentioned efforts in these regards to include the CrossRiver State Plan and the Rural Development Program for Oil Palm Belt. However, PIND (2011) explained that economic reforms initiated since the reintroduction of democracy in 1999 succeeded somewhat in pushing the sector out of stagnation. Between 2001 and 2005, palm oil production increased rapidly from 760 MT to 800 MT, while recording a corresponding rise in local consumption.

The effort to boost local production of oil palm to satisfy local demand, importation of bulk crude and refined vegetable oil was prohibited in 2001. In light of this ban and thus increasing local demand, there has been some increase in private sector investments in the cultivation of new oil palm plantations and the improvement of currently existing ones. Smallholders and out-grower schemes are also being supported by the Federal, State Governments and private sector actors to increase production. Much of this movement can be attributed to the 2001 bulk crude palm oil (CPO) and refined vegetable oil importation ban. However, the reversal of the policy in January 2008, prompted grave misgivings about the fate of the palm oil industry and again impacted negatively on local production. Such inconsistent policies

are key elements that are accountable for the current state of affairs in Nigeria's palm oil industry despite the marked resurgence of agriculture promotion through the last decade.

III. RESEARCH METHODOLOGY

Primary and secondary data were used for the study. The secondary data, obtained from institutional sources, comprise information related to oil palm cultivation and palm oil milling technologies available in the study area. These sources included journals & other publications of relevant institutions such as NIFOR and/or the ADP. The purpose of this was to identify the available palm oil production technologies; production inputs associated with the production process and value chain analysis.

The primary data were sourced from several categories of respondents: palm oil processors/millers, agro-milling machine fabricators in the three agricultural zones in the State, specifically, from three local governments (LGs) in Edo north zone, four LGs in Edo central zone and five LGs in Edo south zone. Data collected using validated questionnaires were analysed using frequency, mean and graphs. The qualitative response obtained from interview sessions i.e. FGDs and key informant interviews were used to elaborate on the quantitative data obtained.

IV. PRESENTATION OF FINDINGS

A. Social Profile of Palm Oil Millers

The personal characteristics of palm oil processors, based on palm oil mill ownership and mill users, are presented in Table 1. The pooled results indicate that majority of millers are male (67.3%) while 32.7% are female. This finding suggests the dominance of males in the palm oil milling process. FGD discussants agreed that the palm oil milling enterprise has more male than female participants. Reasons adduced for this is the drudgery associated with the business, which can be quite stressful for a woman. However, important variation is observed in the sex distribution based on ownership pattern: most mill users i.e. those on lease are female (63.6%) while most mill owners are male (75%). It is possible that the level of cost required to purchase a mill and women's limited access to credit may partly account for the low proportion of women owners of palm oil mills.

The age distribution shows that the majority of processors in the study area are between 30-49 years (43.6%) and 50-59 years (40%). The mean age of the respondents is 49 years, indicating that the millers were a little advanced in age but are still fairly young and therefore able to cope with the physical/energy demands of palm oil milling. Mill owners were slightly younger than those mill users with an average age of 48 to 51 years respectively. Most are married (96.4%) suggesting family responsibility and probably this may have also served as an impetus to be engaged in this business. Furthermore, the average household size is 9, which suggests that any intervention in the oil milling business will impact on quite a number of persons directly or indirectly sustained by the millers. Both the mill owners and mill users have similar sizes of family

i.e. 9. Such large households can constitute an important source of labour in the milling business.

In terms of educational attainment, majority of the millers have primary education (45.5%), 21.8% have secondary education while 1.8% have post-secondary

education. About 31% have no formal education while 1.8% have post-secondary education. However, since about 70% have formal education, the finding suggests that palm oil millers in the study area are fairly literate and capable of working with technical innovations.

		Owner		Users		Pooled	
		Freq	%	Freq	%	Freq	%
Sex	Male	33	75.00	4	36.36	37	67.27
	Female	11	25.00	7	63.64	18	32.73
	Total	44	100.00	11	100.00	55	100.00
Age (years)	20-29	3	6.82		0.00	3	5.45
	30-49	19	43.18	5	45.45	24	43.64
	50-59	17	38.64	5	45.45	22	40.00
	60-69	1	2.27		0.00	1	1.82
	70-79	4	9.09		0.00	4	7.27
	>79			1	9.09	1	1.82
	Total	44	100.00	11	100.00	55	100.00
Marital Status	single	2	4.55		0.00	2	3.64
	Married	42	95.45	11	100.00	53	96.36
	Total	44	100.00	11	100.00	55	100.00
Household size	1-5	7	15.91	1	9.09	8	14.55
	6-10	27	61.36	7	63.64	34	61.82
	11-15	6	13.64	3	27.27	9	16.36
	16-20	2	4.55		0.00	2	3.64
	>25	2	4.55		0.00	2	3.64
	Total	44	100.00	11	100.00	55	100.00

Table 1: Personal Characteristics of Millers

B. Economic Profile of Palm Oil Processors

The economic characteristics of the processors are captured in Table 2. The pooled results show that the millers have other forms of livelihood or secondary occupation, the dominant one being crop production (57.4%). Very few are government employees (7.4%), probably because such employment may not permit sufficient time to pay attention to the milling business. Only about 18.5% acknowledged that palm processing was the secondary occupation, suggesting that for the majority of millers in the State, palm oil processing is the major source of livelihood. It seems most millers are also owners of oil palm plantations as indicated by the pooled result (80%). This is true for the mill owners (84.1%) and mill users (63.6%). The average plantation size for those having oil palm plantations is about 6ha.

The modal palm oil milling experience of the millers is 6-10 years (40.9%), the average experience being about 9 years, which points to the fact that they are quite experienced in the palm oil milling business. The average experience for the mill users is about 10 years, the modal category being 1-5 years (36.4%). Given such length of experience in the business, both categories of respondents should be familiar with the unique challenges associated with the palm oil milling enterprise as well as report on the processing facilities that might enhance their business.

Furthermore, the finding reveals that the primary driver for engaging in palm oil milling was both sets of respondents, as indicated by the pooled result was commercial/subsistence purpose (83.6%). This was true for both the millers (84.1%) and mill users (81.8%). The result suggests the respondents are commercially oriented, and therefore any means of improving the milling process such as the provision of improved milling technology will highly impact their earnings.

The pooled result for the number of millers shows that 45.5% were able to identify 1-5 millers in their community, 32.7% claimed to have 6-10 while 10.9% had 11-15. The average is about 6, indicating that there are not so many persons engaged in palm oil milling in the community probably because of the high capital requirement. However, considering the fact that 10.9% of the respondents said about 11-15 millers exist, it probably suggests that some respondents may be unaware of the existence of other millers. Key informants noted that establishing a forum for the miller to interact would be one way of addressing this challenge. Although some palm oil milling association exists in the study area most respondents (76.4%) claim to be non-members while only 23.6% said they belonged to a palm oil milling association. More millers (25%) were members of the association relative to mill users (18.2%). FGD participants cited the absence of such associations in

some areas, lack of interest and the concern that the association may start demanding levies as reasons for the low membership of these associations. This probably suggests that the use of existing associations may not be a strategic tool for reaching the millers. However, this situation equally shows an opportunity to mobilize palm oil millers into groups for easy intervention and communication outreach. However, discussants noted they have not had any particular relationship with or participated in any intervention programme on palm oil milling organized by any development agencies. They did note that an effective way to mobilize them will be through phone calls and meetings. The enthusiasm they have for any intervention efforts to support their livelihood is a strong motivation for them to respond to any call for meetings by any development agency.

Economic considerations remain a key reason for the membership of such associations (38%), followed by welfare concerns (31%) (Fig. 5). Others are training (15%), access to cheaper inputs (8%) and information (8%). The status of their customers comprises all categories of end-users i.e. marketers and consumers. Most of the customers, FGD discussants noted, are women. The processors sell the palm oil directly at the millingsite or transport it to the market, especially during market days. Sales are also done at home. Customers sometimes make contact with them via GSM/phone calls to know if the product is available. Usually, milling services are offered on a cash basis. However, some did admit that those mill users and marketers they have a long-term relationship with, they sometimes may accept part-payment.

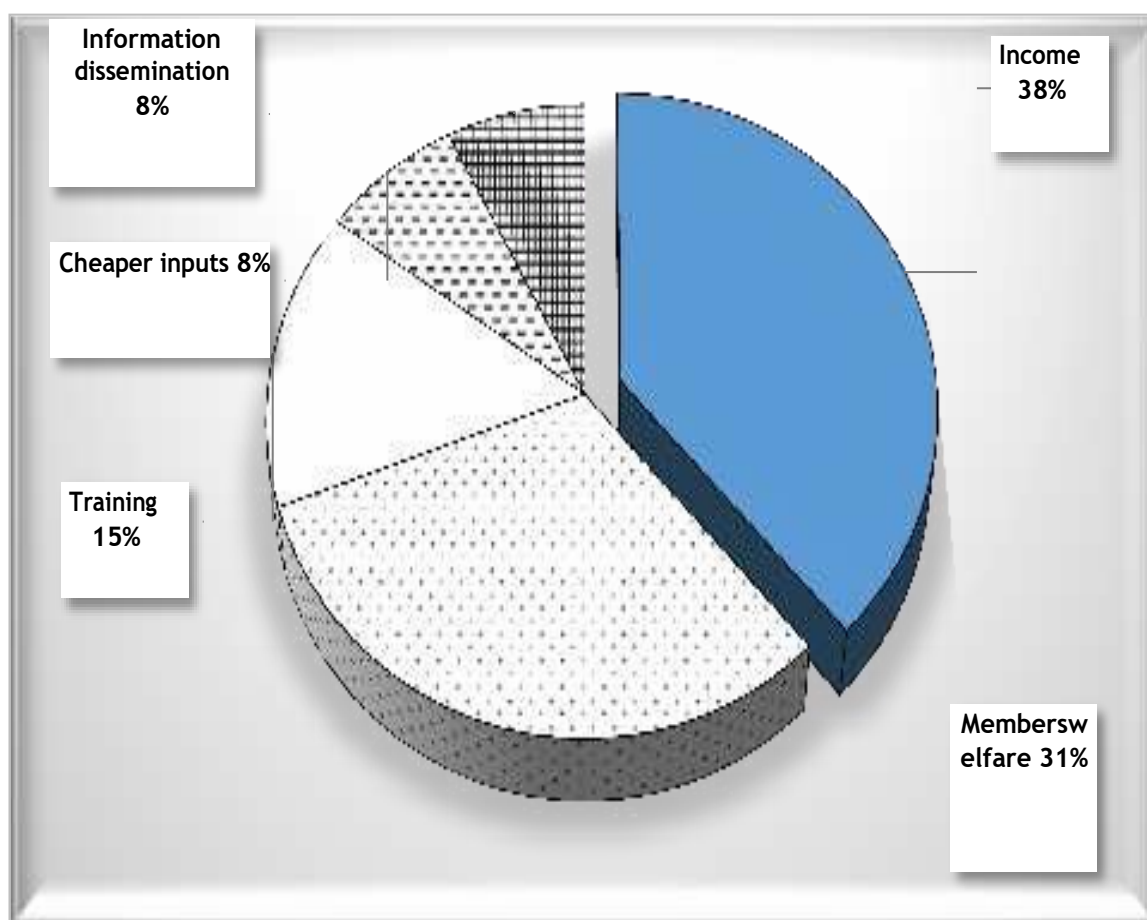


Fig. 1: Benefits of Association Membership

*computation based on n = 13 (association members)

		Millers		Users		Pooled	
		Freq	%	Freq	%	Freq	%
Secondary occupation (Major)	Arable crop production	25	56.82	6	54.55	31	57.41
	Livestock production	2	4.55			2	3.70
	Government employee	4	9.09			4	7.41
	Palm oil processing	9	20.45	1	9.09	10	18.52
	Trading	2	4.55	4	36.36	6	11.11
	Others	1	2.27			1	1.85
	Total	43	100	11	100.00	54	100.00
Palm oil processing experience (years)	1-5	11	25.00	4	36.36	15	27.27
	6-10	18	40.91	2	18.18	20	36.36
	11-15	12	27.27	2	18.18	14	25.45
	16-20	3	6.82	2	18.18	5	9.09
	>25		0.00	1	9.09	1	1.82
	Total	44	100.00	11	100.00	55	100.00
Association membership	Yes	11	25.00	2	18.18	13	23.64
	No	33	75.00	9	81.82	42	76.36
	Total	44	100.00	11	100.00	55	100.00
Production purpose	Subsistence only	3	6.82			3	5.45
	Commercial only	4	9.09	2	18.18	6	10.91
	Both	37	84.09	9	81.82	46	83.64
	Total	44	100.00	11	100.00	55	100.00
Number of millers in the community	1-5	20	45.45	6	54.55	26	47.27
	6-10	17	38.64	1	9.09	18	32.73
	11-15	5	11.36	1	9.09	6	10.91
	>25	2	4.55	3	27.27	5	9.09
	Total	44	100.00	11	100.00	55	100.00
Ownership of oil palm plantation	Yes	37	84.09	7	63.64	44	80.00
	No	7	15.91	4	36.36	11	20.00
	Total	44	100.00	11	100.00	55	100.00
Size of oil palm plantation (ha)	No response	7	15.91	4	36.36	11	20.00
	1-5	23	52.27	7	63.64	30	54.55
	6-10	6	13.64			6	10.91
	11-15	5	11.36			5	9.09
	21-25	1	2.27			1	1.82
	>25	2	4.55			2	3.64
	Total	44	100.00	11	100.00	55	100.00

Table 2: Economic Characteristics of Millers/Mill Users

C. Type and Sources of Mill

Most of the respondents owned one mill and the prevalent type is the traditional mill/vertical digester and screw press (90.9%) as indicated in Table 3. Very few used the semi-traditional mill (7.3%) while even fewer (1.8%) owned the NIFOR Small Scale Processing Equipment (SSPE) i.e. DSP clarifier. The findings show that the improved processing mill is not used by most palm oil millers in the study area. Cost was cited as a major reason for this during the FGD discussion. This is true for both mill owners and users. The use of the traditional mill reduces the output of palm oil milled since the local equipment are known to be very inefficient. Even the FGD discussants acknowledged this. They noted that traditional equipment

possesses several challenges for them. In addition to the low yield of oil, the equipment some claim can be very difficult/costly to maintain as a result of constant breakdown (a common problem is nozzle failure). Many are not too satisfied with the machine maintenance skill of the local equipment repairers, who are more or less mechanics.

Virtually all respondents discussed with expressed strong interest in acquiring modern milling machines, but they are constrained by inadequate capital and the high cost of the milling machines. Discussion with a representative of a microfinance institution shows they are willing to finance oil milling projects, although some reluctance was expressed over the financing of oil palm cultivation given its long gestation period. It was explained that their repayment

period, which is usually monthly for agricultural produce or related activities, will be difficult for the farmers to meet up with except he/she has other businesses that can finance the loan.

The major source of the mills being used by the respondents is the local fabricator (56.3%) followed by the open market (29.1%) (Table 21). Few claimed to have inherited the mills they are using (5.5%). The results show that local fabricators are the major source of mills for palm oil millers in the State. Discussants noted that the fabricators are not usually residents in their community, hence they have to travel to either the city or major towns to access them. This sometimes constitutes serious challenges for them when they have to maintain or carry out repair work on

the machines. However, the finding is a pointer to the fact these local fabricators can be exposed to technical training on developing or improving the present technology being used by palm oil millers in the State.

Virtually all the respondents interviewed preferred the NIFOR improved mill. They believe it is more efficient and produces better palm oil, both in terms of quantity and quality. In terms of operational period (Table4), the pooled results indicate that 10.9% have operated their present mill for 1-3 years, 29.1% have operated it for 4 – 6 years, 12.7% have operated for 10-12 years while 10.9% have operated for above 12 years. The average operational period of the milling machine is 7 years. This view is expressed by both mill owners and mill users.

		Mill Owner		Mill users		Total	
		Freq	%	Freq	%	Freq	%
Mill	Type						
Mill_1	Traditional mill/ Vertical digester & screw press	41	93.2	9	81.8	50	90.9
	Semi-traditional	2	4.5	2	18.2	4	7.3
	NIFOR small-scale processing equipment (DSP clarifier)	1	2.3			1	1.8
	Total	44	100.0	11	100.0	55	100.0
Mill_2	Traditional mill/Vertical digester & screw press	2	100.0			2	100.0
	Total	2	100.0			2	100.0
Mill_3	Traditional mill/Vertical digester & screw press	1	100.0			1	100.0
	Total	1	100.0			1	100.0
Mill_4	Traditional mill/Vertical digester & screw press	1	100.0			1	100.0
	Total	1	100.0			1	100.0

Table 3: Mill Type Owned

	Mill Owner		Mill users		Pooled	
	Freq	%	Freq	%	Freq	%
Source						
Local fabricator	25	56.82	6	54.55	31	56.36
Open market	13	29.55	3	27.27	16	29.09
NIFOR	3	6.82	2	18.18	5	9.09
others	3	6.82			3	5.45
Total	44	100.00	11	100.00	55	100
Length of ownership						
1 to 3	6	13.64			6	10.91
4 to 6	12	27.27	4	36.36	16	29.09
7-10	5	11.36	1	9.09	6	10.91
10 to 12	7	15.91		0.00	7	12.73
>12	5	11.36	1	9.09	6	10.91
No response	9	20.45	5	45.45	14	25.45
Total	44	100.00	11	100.00	55	100

Table 4: Source of Mill & Length of Ownership/Use

D. Sources of Finance and FFB

Fig. 2 and Table 5 show most respondents (69.1%) use personal savings to finance the purchase or lease of mill. Support from relatives accounts for about 11%. For most mill owners and users (see Table 5), mill purchase or lease was financed from their personal savings (70.5% and 63.6% respectively). However, the mill users show a higher dependence on money lenders (27.3%) relative to the mill owners (4.5%). Both male (70.3%) and female (66.7%) millers relied heavily on personal savings to acquire or lease the mills. However, the female millers show a slightly higher reliance on relatives/friends (16.7%) and money lenders (11.1%) than male millers with a percentage of 13.5% and 8.1% respectively. The formal financial sector plays a very minimal role in respondents' access to milling equipment, with the microfinance bank recording only 5.5% overall.

Results (Fig. 3) for the source of finance for the milling house/site equally reveal that personal savings remain the most important source (81.8%). However, based on mill ownership status (Table 4), 18.2% of the mill users patronize money lenders (18.2%) and seek support from family members/friends (18.2%). The gender dimension (Table5) equally shows that family members/friends (22.2%) and money lenders (5.6%) are relatively most-

sought sources of finance for female millers than for male millers with a percentage of 8.1% and 2.7% respectively. The greater need for women to seek credit probably reflects their limited financial status relative to men. The fact that most of the respondents depend on personal savings to raise capital suggests a limited level of investment in the milling business, given the generally low financial status of small-scale processing/milling entrepreneurs. This has implications for the kind of investment they can make in modern milling technology, no matter how desirable it might be.

The major source of FFB for the processors were customers (52.7%). These customers, according to respondents, are those who bring their FFB to be milled. They could be farmers or palm oil marketers who buy FFBs directly from farmers and mill them at the mills. About 18.2% source FFB milled from personal farms while 29.1% purchased the FFB they milled (Fig.4). Based on ownership status (Table 4), the major source of FFB for mill owners were customers i.e. those who bring their FFB to be milled (61.4%), the major source for the mill users was by purchase from oil palm farmers (63.6%). Similarly, most male millers sourced FFB from customers (64.9%) while the majority of women millers sourced FFB from the open market/farmers (55.6%).

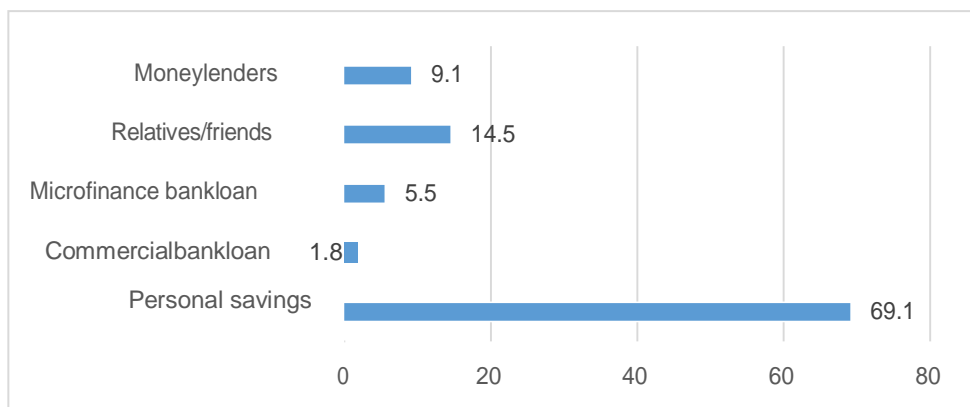


Fig. 2: Source of Finance for Milling Equipment (%)

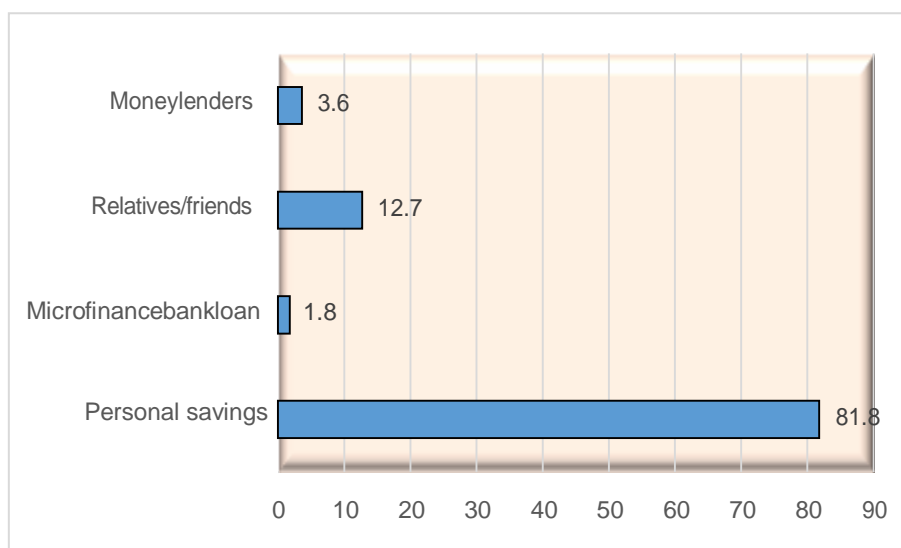


Fig. 3: Source of Finance for Milling House/Site (%)

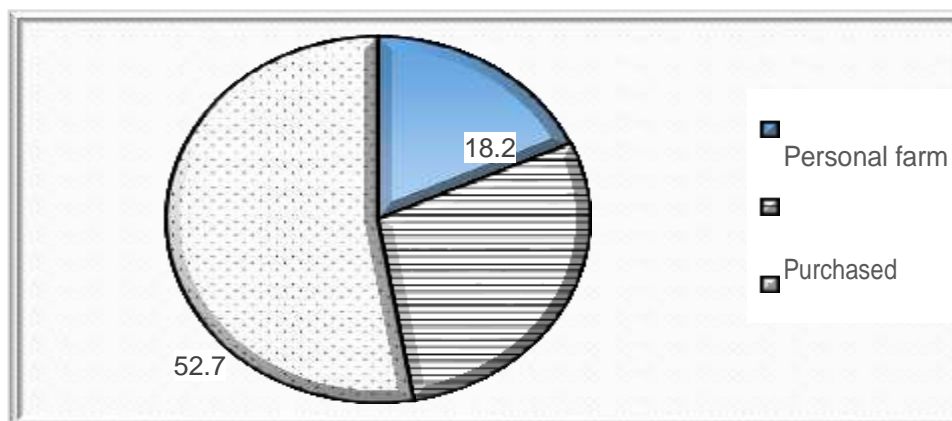


Fig. 4: Source of FFB (%)

	Mill ownership status				Sex				Pooled	
	Owner		Users		Male		Female		Freq	%
	Freq	%	Freq	%	Freq	%	Freq	%		
Milling machine/ equipment										
Personal savings	31	70.45	7	63.64	26	70.27	12	66.67	38	69.09
Commercial bank loan	1	2.27					1	5.56	1	1.82
Microfinance bank loan	3	6.82			3	8.11			3	5.45
Relatives/friends	7	15.91	1	9.09	5	13.51	3	16.67	8	14.55
Money lenders	2	4.55	3	27.27	3	8.11	2	11.11	5	9.09
Total	44	100.00	11	100	37	100.00	18	100.00	55	100.00
Milling house/site								0.00		
Personal savings	38	86.36	7	63.64	32	86.49	13	72.22	45	81.82
Microfinance bank loan	1	2.27			1	2.70			1	1.82
Relatives/friends	5	11.36	2	18.18	3	8.11	4	22.22	7	12.73
Money lenders			2	18.18	1	2.70	1	5.56	2	3.64
Total	44	100.00	11	100	37	100.00	18	100.00	55	100.00
Fruits (FFB)										
Personal farm	8	18.18	2	18.18	7	18.92	3	16.67	10	18.18
Purchased	9	20.45	7	63.64	6	16.22	10	55.56	16	29.09
customers	27	61.36	2	18.18	24	64.86	5	27.78	29	52.73
Total	44	100.00	11	100	37	100	18	100	55	100.00

Table 5: Source of Finance

E. Constraints Faced by Millers

The findings presented in Table 6 indicate that palm oil millers are faced with several serious constraints. Based on the mean benchmark of 2.50, seven of the constraints are considered serious, namely inadequate finance (mean = 3.84), lack of information on modern palm oil processing practices (mean = 3.51), high labour cost (3.49), high cost of milling equipment (3.18), labour scarcity (3.11), high cost of power generation (3.11), erratic power supply (3.02), low pricing of the oil (2.95) and incessant breakdown of milling machine (2.82).

Although the other constraining factors average scores are less than the mean benchmark of 2.50, the frequency distribution, however, indicates that some processors still face challenges in those areas. For example, about 38.1% considered wastage of the FFB a serious constraint in the milling process. This is not surprising since most are making use of traditional milling machines which are not as efficient as the modern or recommended machines. About 36% claimed that the quality of the fruits brought for milling is

sometimes responsible for the low palm oil output recorded. About 36% face water challenges, forcing them to rely on water supply from private water tankers further increasing their cost of production. About 27% identified inadequate firewood as another serious constraint they encounter.

The opinions of FGD participants were that the milling business is faced with several constraints. They identified the use of substandard machines or inefficient equipment, inadequate capital or difficulty in accessing funds, high tax, the drudgery associated with the use of the traditional equipment, incessant machine breakdown, theft by workers, high maintenance cost (high cost of machine parts), difficulty in getting water/firewood sometimes because of the location of the mill, and bad roads. All these constitute a threat to the palm oil milling industry. They strongly believe that the business has a great prospect because of the consistent and sustainable demand for palm oil both by households and industries. The fact that the enterprise is a profitable venture is considered an important strength, which can motivate others to engage in the business and

equally serve as an impetus for financial institutions to support the industry.

Another major concern expressed by the participants was the level of wastage associated with the use of traditional milling equipment.

Based on the mill ownership status (Table 7), the grand mean suggests that these constraints were serious for both the mill owners (grand mean = 2.83) and mill users (2.78) since they are greater than the mean benchmark of 2.50. However, given the higher score for the mill owners, the result suggests the constraints were more serious for them than for the mill users. Similarly, the gender dimension shows that both the male (grand mean = 2.81) and female (2.83) millers faced a fairly similar level of constraints. FGD discussants noted that the female are somewhat more

constrained by the identified constraints especially when it comes to finance.

The respondents have evolved several strategies to deal with some of the identified constraints. The low price of palm oil is usually a serious concern to the millers during the peak season, so what they do is to store the oil till the off-season when prices have improved. Involving family members in their milling operation has been one way of addressing the problem of high labour costs. Most millers have standby electric generators as a measure of addressing the incessant or erratic power supply. The availability of water is crucial in the oil milling process. Respondents reported that they have to purchase water storage tanks and ensure that there is an adequate supply in case of failure of the water providers to supply water when requested.

	Very serious		Serious		Not sure		Not serious		Pooled	
	Freq	%	Freq	%	Freq	%	Freq	%	Mean*	SD
Inadequate finance	48	87.3	6	10.9			1	1.8	3.84	.50
Lack of information on modern palm oil processing	42	76.4	6	10.9			7	12.7	3.51	1.02
High labour cost	33	60.0	19	34.5			3	5.5	3.49	.77
High cost of machine maintenance	23	41.8	22	40.0	7	12.7	3	5.5	3.18	.86
Labour shortage	27	49.1	17	30.9	1	1.8	10	18.2	3.11	1.12
High cost of electricity	26	47.3	17	30.9	4	7.3	8	14.5	3.11	1.07
Erratic/unstable power supply	22	40.0	21	38.2	3	5.5	9	16.4	3.02	1.06
Low price of palm oil	14	25.5	31	56.4	3	5.5	7	12.7	2.95	.91
Incessant breakdown of milling machine	15	27.3	22	40.0	11	20.0	7	12.7	2.82	.98
Wastage	8	14.5	13	23.6	2	3.6	32	58.2	1.95	1.19
Poor quality of fresh fruit bunch	10	18.2	9	16.4	3	5.5	33	60.0	1.93	1.23
Scarcity of water	8	14.5	12	21.8	3	5.5	32	58.2	1.93	1.18
Inadequate firewood	7	12.7	8	14.5	6	10.9	34	61.8	1.78	1.12

Table 6: Constraints Faced by Palm Oil Millers

*Serious (mean ≥ 2.50)

	Mill ownership status				Sex			
	Owner		Leased		Male		Female	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Inadequate finance	3.84	.53	3.82	.40	3.78	.58	3.94	.24
Poor quality of fresh fruit bunch	1.95	1.24	1.82	1.25	1.86	1.18	2.06	1.35
Wastage	2.05	1.18	1.55	1.21	2.03	1.19	1.78	1.22
Low price of palm oil	2.91	.94	3.09	.83	2.95	.85	2.94	1.06
Incessant breakdown of milling machine	2.86	1.03	2.64	.81	2.86	.98	2.72	1.02
High cost of machine maintenance	3.25	.84	2.91	.94	3.19	.84	3.17	.92
High labour cost	3.48	.82	3.55	.52	3.51	.77	3.44	.78
Labour shortage	3.14	1.11	3.00	1.18	3.30	.94	2.72	1.36
Scarcity of water	1.95	1.22	1.82	1.08	1.95	1.22	1.89	1.13
Inadequate firewood	1.73	1.06	2.00	1.34	1.62	1.01	2.11	1.28
Erratic/unstable power supply	3.07	1.07	2.82	1.08	3.00	1.05	3.06	1.11
High cost of electricity	3.09	1.10	3.18	.98	3.00	1.15	3.33	.84
Lack of information on modern palm oil processing	3.41	1.11	3.91	.30	3.46	1.04	3.61	.98
Grand Mean	2.83		2.78		2.81		2.83	

Table 7: Constraints Faced by Processors Based on Mill Ownership and Sex

*Serious (mean ≥ 2.50)

V. CONCLUSION AND RECOMMENDATIONS

The study examined specific issues relating to smallholder palm oil processors/millers in Edo State, Nigeria. Using rapid rural appraisal, data were collected from palm oil millers, supplemented with individual and group interviews with palm oil milling machine fabricators. Data collected using a questionnaire were analysed using frequency, mean and graphs. The qualitative response obtained from interview sessions were used to elaborate on the quantitative data obtained.

- The prevalent milling equipment used by the respondents was the traditional mill i.e. vertical digester+manual screw press (90.9%). This was true for both mill owners and mill users.
- The major source of the traditional mill used by the millers were local fabricators (56.3%). The use of this equipment is plagued with several challenges: In addition to the low yield of palm oil, is the constant breakdown and high maintenance cost.
- The average length of time the respondents have been using their milling equipment was 7 years;
- The preferred mill type by the respondents was the NIFOR SSPE, which they believe is more efficient and produces better quality palm oil, and virtually all the respondents expressed strong interest in acquiring the modern milling equipment (i.e. NIFOR SSPE). However, they are constrained by inadequate capital and the high cost of the equipment.
- The majority of the millers (69.1%) used personal savings to finance purchase of milling equipment and mill site/house. This was true for most mill owners (70.5%) and mill users (63.6%). Similarly, most male (70.3%) and female (66.7%) millers relied heavily on personal savings to acquire/lease the equipment. However, the female millers showed a slightly higher reliance on relatives/friends than their male counterparts.
- The major sources of FFB milled for the millers were either direct purchases from farmers and/or from customers. While the majority of mill owners sourced the FFB milled from the customers (61.4%) that patronized them, the major source for the mill users was direct purchase (63.6%) from farmers. Similarly, most of the male millers sourced the FFB milled from the customers (64.9%) that come to mill with them, while majority of the women millers sourced the FFB from the open market/farmers (55.6%).
- Important factors believed to facilitate the success of any miller included access to or ownership of modern processing equipment, which increases efficiency, production and sale of high-quality palm oil, which encourages continual patronage by the clients/customers, as well as access to loan and ownership of oil palm plantation.

Based on the findings above, the following were recommended:

- Access to production machine financing facilities domiciled with the Bank of Industry that will enable millers to raise the needed capital to buy their

preferred NIFOR SSPE milling machinery that is more efficient and delivers higher production output.

- Organizing capacity development programmes for millers on the handling of modern or improved milling equipment to enhance their processing method and product quality
- Promote awareness of NIFOR SSPE among millers, through sponsored seminars, practical demonstrations, SSPE fabricators
- Expansion of the market at the macro level through promoting establishments/ industries that make use of palm oil;
- Improved the miller's access to funds through the formation of groups and linking them to credit institutions. This will enhance the ability to afford the recommended milling equipment;
- Providing millers with regular information on new developments in the milling industry and market opportunities

REFERENCES

- [1.] Adebo, G.M., Ayodele. O.J., and Olowokere. K. (2015). Palm Oil Production as a Poverty Alleviation Strategy among Small-scale Farmers in Ekiti State, Nigeria. *World Journal of Agricultural Research*, 3(2): 43-48
- [2.] Agboola S. A. (1979). *An Agricultural Atlas of Nigeria*. Oxford University Press. Pp 115-134
- [3.] Aladewolu, C. (2016). *It's shameful Nigeria imports palm oil*. Retrieved from <http://www.vanguardngr.com/2012/04/the-nigerian-palm-oil-industry-what-went-wrong-and-the-way-forward-part-1-3/>.
- [4.] Ayokhai, F.E., Naankiel, P. (2016). Towards resolving Nigeria Development Crises: A historical diagnosis of the oil palm industry. *International Journal of Asian Social Science*. 6(9): 537-551.
- [5.] Carbaugh, J. R. (2009). *International economics* (12th ed.). Independence, KY: Cengage Learning
- [6.] Central Bank of Nigeria (CBN, 2015). Speech By Governor Godwin Emefiele, CON, During a Meeting with Oil Palm Value Chain Stakeholders (Plantation Owners, Refiners, Research Institutes and Associations) At GCC Meeting Room Central Bank Of Nigeria (CBN) Headquarters, Abuja On July 10, 2015. Retrieved on 12 June 2020. <https://www.cbn.gov.ng/Out/2015/CCD/speech-at-oil%20palm%20stakeholders%20meeting.pdf>
- [7.] DFID. (n.d.). The M4P Operational Guide - Making Markets Work for the ... Retrieved 2 18, 2019, from DFID: <http://www.setoolbelt.org/resources/1836>
- [8.] Ekenta, C.M., Ajala, M. K., Akinola, M.O. and Oseni, Y. (2017). Abandoned Nigerian Economic Resources: The Case of Oil Palm. *International Journal of Agricultural Extension and Rural Development Studies* Vol.4, No.2. 1-16.
- [9.] Emokaro, C. O. and Ugbekile, P. C. (2014). Economic Analysis of Oil Palm Processing in OviaNorth East and Ikpoba-Okha Local Government Areas of Edo State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment*. 10(2):70-78.

- [10.] European Palm oil Alliance (2017). *What is palm oil?* Retrieved from <http://www.palmoilandfood.eu/en/what-is-palm-oil>
- [11.] FAO, (2002). *Small-scale palm oil processing in Africa*. Rome: Food and Agricultural Organization (FAO).
- [12.] Lokpobiri, H. (2019). Nigerian Agriculture Promotion Policy 2016 – 2020: Towards a New Paradigm for Domestic Food Security and Foreign Exchange Earnings in Agricultural Production. *Journal of Public Policy and Administration Research*, Vol.9(3). Pp 47 – 57
- [13.] Mgbakor, M.N., Ugwu, J.N. and Frank, O. (2013). Problems and prospects of oil palm production in Isoko South Local Government Area of Delta State, Nigeria. *American-Eurasian Journal of Agronomy* 6 (2): 40-45.
- [14.] Nairaland (2015). Nigerian States and What They Produce - Politics – Nairaland. <http://www.nairaland.com/2521578/nigerian-states-what-produce>
- [15.] NIFOR (2015). All about NIFOR in brief. <http://www.nifor.gov.ng/aboutus.php>
- [16.] Okogba E. (2018). Why we earmarked 200, 000ha for oil palm plantation – Obaseki. Vanguard Newspaper. Retrieved on 12 June, 2020. <https://www.vanguardngr.com/2018/04/why-we-earmarked-200-000ha-for-oil-palm-plantation-obaseki/>
- [17.] Okomu (2016). Okomu Oil Palm Company: About us. <http://www.okomuoilplc.net/about>
- [18.] Osalor, P. (2012). *The Nigerian palm oil industry: what went wrong and the way forward*. Retrieved from <http://www.vanguardngr.com/2012/04/the-nigerian-palm-oil-industry-what-went-wrong-and-the-way-forward-part-1-3/>
- [19.] PIND (2011). A report on Palm Oil Value Chain Analysis in the Niger Delta. Foundation for Partnership Initiatives in the Niger Delta (PIND), Abuja p20
- [20.] Shittu, B. (2017). Agricultural policies to ensure food security, improve nutrition in Nigeria. <https://www.today.ng/news/nigeria/24148/agric-policies-ensure-food-security-improve-nutrition-nigeria>.
- [21.] Soyebo, K.O.; Farinde, A. J. and Dionco-Adetayo, E. D. (2005). Constraints of Oil Palm Production in Ife Central Local Government Area of Osun State, Nigeria. *Journal of Social Social Science*, 10(1): 55-59.
- [22.] The Food and Agriculture Organization of the United Nations. (2014). The state of food and agriculture: Innovation in family farming. <http://www.fao.org/3/a-i4040e.pdf>
- [23.] The Food and Agriculture Organization of the United Nations. . (2014). The state of food and agriculture: Innovation in family farming. <http://www.fao.org/3/a-i4040e.pdf>
- [24.] World Bank (2013). World bank to help Nigeria boost agriculture and improve food security. <https://reliefweb.int/report/nigeria/world-bank-help-nigeria-boost-agriculture-and-improve-food-security>
- [25.] WRM (2010). “Oil palm in Nigeria”, WRM's bulletin N°; 161 December2010<http://oilpalminafrica.wordpress.com/2010/08/06/oil-palm-in-nigeria>.
- [26.] Zeven, A.C. (1965). Oil Palm Groves in southern Nigeria: Part I. Types of Groves in Existence, *Journal Nigeria Institute for Oil Palm Research*. 4: 226-50.