Level of Oil Palm Production Mechanization in Selected Local Government Areas of Oyo and Osun States, Nigeria.

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Abstract

Productivity of any agricultural produce such as oil palm (*Elaeis guineensis)* can be enhanced using mechanical means for the removal of drudgery from the entire production processes. This study investigates the level of mechanization in the production and processing of oil palm in Oyo and Osun States so as to determine the research needs towards the development of appropriate machines for this purpose. Questionnaires were administered and on-the-field assessments were made to obtain the necessary information. The data collected were analyzed with descriptive statistical tools. Eight selected local government areas where oil palm production was adjudged to be popular were visited. The study revealed that pre-planting, planting and post planting operations involving crop protection, weeding and fertilizer application receive low mechanization. Harvesting was carried out completely by manual operations. Threshing of fruits was semi- mechanized. Palm oil extraction processes had approximately 30% of mechanization which was obtained from few palm oil mills. Kernel cracking and palm kernel oil extraction had 50% level of mechanization. The study concluded that the level of oil palm mechanization in Oyo and Osun States was very low especially the pre-planting, planting and harvesting operations and Agricultural Engineers should be encouraged and rise up to the challenges of providing the required machinery.

Keywords: mechanization, oil palm, planting and post planting operations, postharvest handling.

1. Introduction

The oil palm comprises two species of the *Arecaceae* palm family. It is generally agreed that oil palm originated in the tropical rain forest of West Africa. The oil produced from oil palm is highly flavored and is an essential ingredient in most of the traditional South-western cuisine. The traditional process of oil palm is simple but tedious. The effort of government to improve oil palm industry led to the establishment of NIFOR a research institute purposely meant for the conduct of research on mechanization and improvement of the methods of cultivation, harvesting, processing, preservation, and storage of oil palm and its products (www.nifor.org). The institute has varied and enormous infrastructure and has made a considerable impact over the years since its establishment in 1939, through research development and extension support for the Nigerian palm industry.

Mechanization became necessary in the process of trying to remove the tedious aspect of the oil palm cultivation down to processing stage of the fruits. Mechanization has become a common word in oil palm industry of Nigeria over the last two decades (Walker 2010). It is commonly recognized as a means of solving increasingly acute shortage of labor in the plantation and processing sector.

Effort to mechanize and improve traditional manual procedures has been undertaken by research bodies development agencies such as NIFOR, but has been a piecemeal and uncoordinated (Uexkull 2006). They are generally concentrated on removing the drudgery associated with mashing and pounding stage (digestion) and improving the efficiency of oil palm extraction. Mechanized harvesting of oil palm was attempted without much success (Walker 2010). The major objectives of mechanization of oil palm industry in Nigeria are: To increase palm oil production, to reduce the cost of production of palm oil and to reduce or remove drudgery associated with the cultivation, processing, and storage of oil palm (Uexkull 2006).

1.1 Oil Palm Production in Nigeria

In Nigeria, oil palm is indigenous to the coastal plain, having migrated inland as a staple crop. For millions of Nigerian, oil palm cultivation is part of the way of life, indeed it is part of their culture. However, during the past decades the country has become a net importer of palm oil. While in the early 1960s, Nigeria's palm oil production accounted for 45% of the world production which has now dropped to 7% of total global output (Walker 2010).

In Nigeria 80% of production comes from dispersed small holders who harvest semi-wild plants and use manual process techniques. Several million small holders are spread over an estimated area ranging from 1.65 million hectares to 2.4 million hectares and to a maximum of 3 million hectares. Women play an important role in the production, storage and commercialization of the red palm oil. (Walker 2010). The world palm oil production is represented in Figure 1.
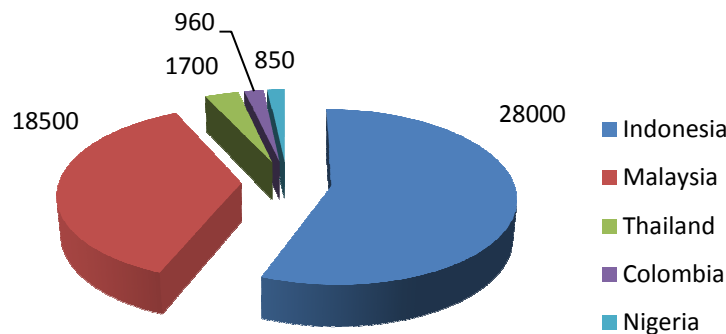
Figure 1: Palm oil production for 201(Metric Tonnes)
(Source: USDA 2012)

Oil palm plantation and its post-harvest processes is a rigorous process which involves a lot of standing up and bending. It is also observed that there could be contamination of the palm oil due to the crude means of processing being used which could be hazardous to health. Hence there is need to mechanize all the stages involves. The aim of this project is to know the level of oil palm mechanization in Oyo and Osun States of Nigeria.

2. Methodology

2.1 Administration of questionnaire

A set of questionnaire was used for the collection of data for the study. It covered information on mechanization of oil palm from land preparation through postharvest handling/technologies and the socio economic characteristics of the respondents. Palm oil extraction is popular among the residents of the following local government; Obokun, Ayedaade, Orolu, Ejigbo, Iwo, Egbedore areas of Osun State (OSSADEP, 1997). While in Oyo State, palm oil extraction is popular in Ilora, Odo oba, Lagbedu, Iresapa, Ogbomoso,Ipeba and Otamokun in Afijio, Ogo Oluwa and Surulere local government areas

2.2   Sources of Data

The study's sampling technique comprises of two stage procedures which is the primary and secondary source of data for the purpose of obtaining necessary information for this research work.

(1) The primary source includes reconnaissance and field survey. It involves the random selection of twenty (20) palm oil extraction household in each of the selected areas. It made a total of one hundred respondents for the study in order to have insight into the essential features and characteristics.

(2) The secondary data was collected through the administration of questionnaire. It was analyzed using descriptive statistical tools.

3. Results and Discussion

3.1   Planting of Oil Palm

Table 1 reveals that 99% of the respondents depend solely on traditional method of land preparation. This involves using of cutlass and hoe for clearing bushes and cutting down of trees. This is energy demanding method of clearing. This method cannot be used on large scale farming because it is time consuming and stressful. The 1% that makes use of mechanized method for land preparation uses bulldozer for clearing the bush followed by ploughing and harrowing to loosen the soil.

Table 1: Distribution of Respondents on Pre-harvest and Harvest Activities

Activities	Frequency	Percentage
Land preparation		
Traditional	99	99
Mechanized	1	1
Planting		
Traditional	100	100
Mechanized	0	0
Nursery		
Yes	29	29
No	71	71
Transplanting		
Traditional	100	100
Mechanized	0	0
Crop protection		
Traditional	97	97
Mechanized	3	3
Harvesting		
Traditional	99	99
Mechanized	1	1

From the survey, it was discovered that all the respondents plant and transplant manually with the use of cutlass for digging to a 304.8 mm diameter planting hole to accommodate a 28 cm width x 36 cm long polybag seedling (Darus & Azmi, 2003) as shown in Table 1.

Harvesting of oil palm bunches is done by climbing the palm tree in almost all the places visited as shown in Table 1, which means traditional harvesting has the highest percentage compared with mechanized harvesting. However, 3% make use of harvesting knife which consists of a sickle attached to a variable pole length.

3.2 *Distribution of Respondents on other Activities Involved in the Processing*.

The various activities involved in palm oil extraction as carried out by respondents are shown in Table 2. The results revealed that all respondents' palm oil extraction and kernel activities were predominantly carried out using traditional practices (Oke, 2002) except in the case of the digestion activities where digesters were used. This shows a low level of mechanization of processing activities in comparison to countries like Indonesia and Malaysia who are the major producers of the world palm oil and kernel. The result on respondents' palm oil and kernel extraction practices generally agrees with that of Purseglove (1985) that the indigenous methods of processing oil palm in West Africa are crude resulting in poor quality of its end products.

Table 2: Distribution of Respondents based on Methods used for Postharvest Activities.

Activities	Frequency	Percentage
Threshing		
Traditional	100	100
Mechanized	0	0
Total	100	100
Sterilization		
Traditional	99	99
Mechanized	1	1
Total	100	100
Fruit digestion		
Traditional	99	99
Mechanized	1	1
Total	100	100
Oil clarification		
Traditional	99	99
Mechanized	1	1
Total	100	100
Palm kernel recovery		
Traditional	99	99
Mechanized	1	1
Total	100	100

4 Conclusions and Recommendation

The available machines to make each post-harvest stage of oil palm production easier and the little amount of palm oil produced in a year compared to the huge number of people involved in the production shows a low level of mechanization.

Also, the fact that only the digestion stage of the post-harvest has received mechanization to a great extent further proofs a poor mechanization level in comparison with the leading countries in oil palm production who have been able to mechanize each stage of production.

The following recommendations were made:

- Nigerian Government should explore opportunities abound with Oil palm plantation management as a substantial source of foreign exchange earnings through:
- Establishment of Palm Oil Board and /Palm Oil Council to encourage large scale production of oil palm through Mechanization of the processes and aggressive training of the entire citizenry interested in Oil palm cultivation, overseas/monitor the activities.
- Encourage researchers in Agricultural Engineering and other related discipline in terms of reasonable research grants with progress report from the Awardees.
- Oil palm farmers should come together to form a strong bond to be able to acquire some of the existing machines and equipment to boost their productivity with little or no hazards/difficulties.

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