

**DELTA STATE GOVERNMENT**

**OFFICE OF THE CHIEF JOB CREATION  
OFFICER  
GOVERNOR'S OFFICE**

**YOUTH AGRICULTURAL ENTREPRENEURS  
PROGRAMME (YAGEP)**

**TRAINING MANUAL**

**ON**

**GROWING OIL PALM FROM LAND PREPARATION  
TO HARVESTING AND BUSINESS OPPORTUNITIES  
ALONG THE VALUE CHAIN**

**BY**

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## **1.0 INTRODUCTION**

In the early 70s, Nigeria led the rest of the World in the production of Crude Palm Oil (CPO) and associated products. Through its well-developed research institute, the Nigerian Institute of Oil Palm Research (NIFOR) near Benin, Nigeria was able to breed and market the high yielding disease resistant and short stem tenera palm, generally known as Extension Work Seed (EWS) from the wild tall palm (Dura) and Piscifera Palm.

Dura x Piscifera = Tenera hybrid (EWS).

## **2.0 HOW TO GROW OIL PALM (*Elaeis guinensis*)**

To grow oil palm requires the following steps.

a) Acquisition of oil palm sprouted seeds (from NIFOR, PRESCO OR OKOMU)

b) **Establishment of a nursery**

In the nursery, sprouted seeds are sown in black poly bags filled with manure soil and the sprouted seeds are nurtured to grow for 11 to 12 months into seedlings inside the poly bags.

To promote healthy growth seedlings are usually watered very

early in the morning before 7am and late in the evening after 6pm. Little farm land manure or inorganic fertilizer (NPK) may be added.

Oil palm seedlings can also be purchased from NIFOR, PRESCO OR OKOMU Oil Palm Establishments.

c) **Establishment of the Oil Palm Plantation**

For most oil palm plantations the following procedures are followed:

i. Land Preparation

This involves brushing/slashing of the undergrowth, felling /cross cutting of trees, burning and removal of tree stumps.

ii. Marking or pegging out

Seedlings are planted at 9mx9mx9m triangular. Marking out is done using measuring tape and the position of the seedlings located with straight sticks. Planting density is 150 palms per hectare.

iii. Planting of seedlings (best at the onset of the rainy season between April and May). Seedlings are planted

triangularly 9mx9mx9m to give a plant density of 150 palms per hectare. The process is as follows:

- Excavate planting holes with shovel.
- Cut the poly bag and place the palm upright in the hole without disturbing soil and root mass.
- Fill the hole with soil and firmly consolidate the soil at the base of the seedling.
- Irrigate the seedlings immediately to reduce transplanting shock.

d) **Maintenance of the Oil Palm Plantation.**

Weed control can be achieved 3 to 4 times a year through constant slashing/brushing and ring weeding round the bottom of the palms. Herbicides including glyphosphate (round up) paraquat, force up, touch down etc can also be used.

For younger palms 1-2 years, constant weed control is advised to avoid rodent (grasscutter) attack.

During the dry season, fire tracing round the farm to avoid bush burning is also imperative.

To enhance productivity, it is also necessary to constantly prune the palms

e) **Fertilization**

For optimum growth and production, the nutrient needs of the palms must be met through fertilizer application. Dependent on age and available nutrients in the soil, 1 to 3kg of 12-12-17-2 (NPKMg) or 15-15-15 (NPK) compound fertilizers can be applied. Application is best at the onset of the rains in April/May or in two split equal doses at the onset of the rains in April/May and when the rains are receding in October.

Soil analysis to determine the physico-chemical characteristics of the soils is advised. Deficiency symptoms of any of the major nutrients will manifest in the leaves.

f. **Diseases and Pest of the Oil Palm and the Control.**

The major diseases of the oil palm in Africa causing serious economic losses include freckle, blast, vascular wilt, ganoderma trunk rot, corticium leaf rot and armillaria trunk rot.

The best method of control is the use of disease resistant or tolerant varieties.

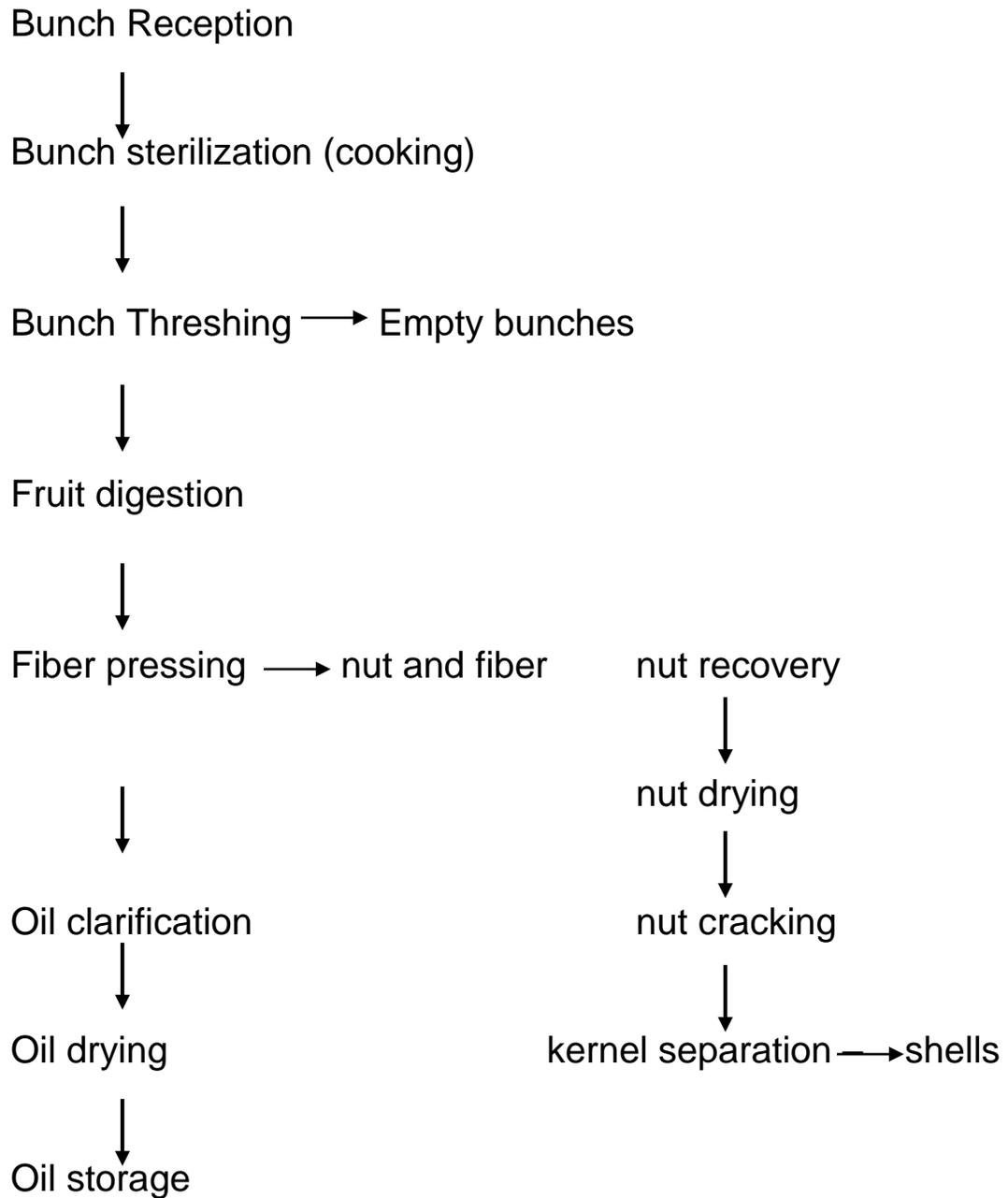
Pest include palm weevils, rhinoceros beetles, weevils, leaf miners, slug caterpillar, nettle soil nematods, rodents including grasscutter, rats etc.

Control can be effected using chemical pesticides applicable to such pests.

g) **Harvesting of Bunches**

Palm hunches are harvested after the 4<sup>th</sup> or 5<sup>th</sup> year of planting using cutlass. As the palm grows taller, malaysian knives hooked on poles are used. Older palms are harvested with the aid of climbing roles. Motorized harvesters are now in use in Indonesia, Malaysia etc.

## h) **Palm Oil and Palm Kernel**



The process involves cooking (sterilization) of the bunches. Next is the threshing to remove (separate) the fruits from the bunches. The loose fruits are thereafter digested and sent to the press where the

palm oil is pressed out of the fruits. The palm oil is next clarified, dried and stored as Crude Palm Oil (CPO).

### **Refining of Crude Palm Oil and crushing of palm kernel.**

The red Crude Palm Oil (CPO) is bleached (to decolorize it) deodorized (to remove the odour) in order to form a Refined, Bleached Deodorized Oil (RBDO) and Palm Fatty Acid Distillate (PFAD). RBDO is then fractionated into palm olein and stearin. The palm kernel is crushed to give crude Palm Kernel Oil (PKO) and Palm Kernel Cake (PKC).

The CPKO can be further refined to give Refined Palm Kernel Oil (RPKO).

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## **1.0 THE MILL BUILDING**

For a small to medium scale operation, handling between 1t to 2.5t of fresh fruit bunches (FFB) per day, a concrete floor space of 80 – 100m<sup>2</sup> is required, open on three sides plus a store. This comprises of

- a. Palm bunch reception area of at least 20m<sup>2</sup>, to where the bunches are collected, quartered and made ready for the next process,
- b. A processing area of about 30m<sup>2</sup> – 40m<sup>2</sup>, where the equipment are installed, i.e the sterilizer, the digester/diesel engine, the press (optional), and the clarifier,
- c. The storage area for the finished product, spo or special palm oil, 20m<sup>2</sup> or more, which should be secured, and could be used as office.

## **2.0 HANDLING EQUIPMENT**

The handling equipment required are:

- a. Cutlasses or small axes for halving/quartering of bunches,
- b. Wheel barrows/head pans for conveying the ffb and loose palm fruits
- c. Shovels, rakes, buckets, half drums, jericans
- d. Steel prods and prongs for shifting and lifting ffb, and stoking fires respectively
- e. Hand gloves, rain boots/protective shoes e.t.c.

## **3.0 PROCESSING EQUIPMENT**

- a. One weighing scale, platform type, up to 500kg capacity
- b. Rotary stripper (optional) to remove the fruits from the quartered bunches
- c. STERILIZER: which steams or boils the raw fresh fruit, ready for maceration
- d. DIGESTER: a rotary power driven metal piece of equipment which macerates the cooked palm fruits ready for the recovery of palm oil then clarification.

- e. **PRESS:** this is a mechanical press which extracts the crude palm oil macerated from the digester. This is collected in containers and poured into the clarifier  
 \*\*\* This stage is sometimes optional, as some processors ‘wash’ out the crude palm oil from the digester and pour the collected material into the clarifier.
- f. **CLARIFIER:** this is a cylindrical metal container, in which the raw/crude palm oil is boiled to the level where the pure palm oil is recovered.
- g. After clarification, we have the special palm oil collected in metal containers and decanted into jericans, and the ‘waste’ sludge is channeled into a tank where it can be used for livestock.

#### **4.0 THE RECOVERY RATE**

The recovery rate for palm oil production is between 20 – 25% depending on the palm fruit.

Dura	-	20%
Tenera and Picifera	-	25%

#### **5.0 USES OF PALM OIL**

Palm oil and its products have various uses both edible and non-edible.

##### **5.1 EDIBLE USES**

- a. Cooking/frying oil
- b. Shortening and cooking fats
- c. Domestic margarine such as Holsum
- d. Miscellaneous
  - In condensed milk to replace “butter oil”

- Vegetable oil based ice cream
- Cocoa butter substitutes as cabotrine

## **5.2 NON-EDIBLE USES**

- a. Soap industry
- b. Tin plant industry (as a flux)
- c. Cold rolling process of shut steel
- d. Cosmetics, Ointments, Lotions
- e. Production of lubricating oil, grease and plasticizer
- f. Pharmaceutical industry
- g. Confectionery industry
- h. Production of alcohol
- i. Production of potash fertilizer
- j. Potential in the manufactures of pulp
- k. Fencing and reinforcing of buildings
- l. As fuel
- m. As aggregate for concrete

Therefore, the major consumers of the products include hotels, restaurants, food vendors, vegetable oil refineries, bakery fats and margarine producers, soap and detergent manufacturers, households etc.

## **6.0 PALM KERNEL CRACKER UNIT**

- I. Nut/Fibre Separator
- II. Palm Kernel Cracker
- III. Separator Nut/Shell

## 7.0 THE FLOW CHART DETAILS THE PROCESS OF PALM OIL PRODUCTION

