

CHAPTER 17

Husbandry of Selected Crops

OBJECTIVES

At the end of this chapter, students should be able to classify crops based on the following:

- â state major husbandry practices.
- â raise at least one representative crop from each of the following groups:
 - â Cereals
 - â Pulses (grain legumes)
 - â Roots and tubers
 - â Vegetables and fruits
 - â Beverages and spices
 - â Oil, latex and fibre

17.1 Introduction

In Nigeria, crops are grown to supply food and feed for man and animals, raw materials for industries. Most of these crops are cereals, pulses, root and tubers, vegetable, fruits, beverages, spices, oil, latex and fibre. Each of these crops require certain husbandry practices such as land preparation, planting date, spacing, fertilizer application, weeding, diseases and pest control.

17.2 Crop Husbandry Practises

The major crop husbandry practices are categorised into three as follows:

- â pre-planting operations
- â planting operations
- â post-planting operations

(a) Pre-planting Operations: These refers to activities that are carried out before planting a crop. These activities include the following:

- â **Choose a site/site selection:** Select a suitable site that is best for each crop. For example, slightly acidic soil is suitable for oil palm while neutral soil is required for cassava. Generally the following should be noted to avoid planting on sloppy land/terrain. It should not be far from accessible road.
- â **Land survey:** This is done to determine the area of the farm land and the soil type and the topography.

â **Land clearing:** It involves the removal of the vegetative cover in preparation for tillage operation. This can be done mechanically by using bulldozer on a commercial level and manually by use of cutlass.

â **Stumping:** This is the removal of the remains of tree (root stumps) which can obstruct tillage operations.

â **Farm layout:** This involves field mapping/plotting.

â **Land preparation/tillage operation:**

This is the act of turning the topsoil which is done manually or mechanically by using hoe, plough and ridger.

(b) Planting Operations: These are activities involved in the actual planting of crops. Planting should be done when soil is sufficiently moistened. This includes:

â **Selection of planting material:**

The act of choosing viable seeds and good planting materials.

â **Seed health festing:** This is to determine the viability of seeds. Using field method and floatation method.

â **Seeding:** The actual planting of seed directly or indirectly in the nursery.

(c) Post-planting Operations: These are activities that are carried out after planting the crops. Post-planting operations can be divided into two categories as follows:

1. Nursery activities: This is the care given to tender crops raised in nursery. The activities include watering, supplying, shading, manuring, weeding and insect pest control.

2. Field activities: These are operations carried in the main farm land. These include:

â **Supplying:** The act of replacing missing stand (those that did not germinate).

â **Thinning:** The removal of excess seedlings from the stand, usually the less vigorously ones.

â **Weeding:** The removal of weeds in the farm manually, mechanically and chemically.

â **Manuring/fertilizer application:**

The use of organic or inorganic manure to improve soil fertility.

â **Pruning:** The act of removal of unwanted branches using pruning saw, shears and cutlass.

â **Mulching:** The use of vegetative cover to prevent evaporation of moisture from the soil surface.

â **Pest control:** Use of chemical and other means to reduce the attack of small organisms like bird, rat, aphids.

â **Harvesting:** A process of gathering matured farm produce.

â **Processing:** The act of changing the forms of farm produce

â **Storage:** Keeping of the farm produce for later use or sale.

17.3 Harvesting Practises of Selected Crops

17.3.1 Cereals

There are crops in the grass family that produce grains that are consumed by human beings and livestock. Examples of cereal crops include the following: Maize, sorghum, guinea corn, millet, oats, barley and acha.

Maize

Maize belongs to the family Poaceae. The seed of maize is caryopsis with its epicarp tightly fused with the mesocarp. Maize has a botanical name *Zea mays* Scientific name- *Zea mays*

Common name - maize

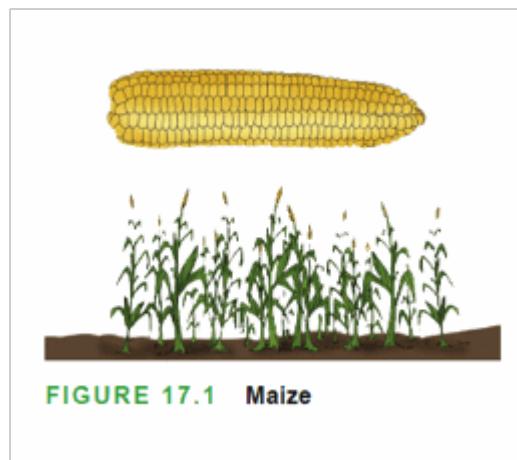


FIGURE 17.1 Maize

Local names: Agbado (Yoruba), Oka (Ibo), Masara (Hausa)

VARIETIES TZB, FARZ 21, NS1, NS2, NS3, DMR-W, DMR-Y, SUWAN, IKOM, white, Calabar local and Lagos white.

Land preparation:

- â Clearing the farm manually or mechanically.
- â Maize is planted on (i) fl at (ii) beds (iii) ridges.

CLIMATIC AND SOIL REQUIREMENT

Temperature: Maize requires a temperature of 22°–33°C.

Rainfall: 75–150 cm per annum.

Soil requirements: Well drained loamy or sandy loamy soil with high content of organic manure, soil pH 6.5–7.5.

Planting date: Maize is traditionally planted in two seasons in the south and once in the north. Early planting: March–April. Late planting: July–August. Maize may be planted all the year round using irrigation and depending on the rate of rainfall.

Seed rate: 25 kg per hectare at one to two seeds per hole.

Propagation: Use of seed, it can be planted manually or mechanically.

Spacing: 75 Å— 25 cm at one seed per hole, 90 Å— 30 cm at two seeds per hole, as sole crop 90 Å— 60 cm at two seeds per hole.

Sowing density: 2 to 3 seeds per hole.

Sowing depth: 2–4 cm.

Germination: 4–7 days after planting.

CULTURAL PRACTICES

Supplying: Re-plant to replace ungerminated stands after 7–9 days.

Thinning: Removal of weak or excess seeds from the germinated ones, four seeds thin to two vigorous ones, two seeds thin to one.

Manuring/fertilizer application:

- â Apply N.P.K 15:15:15, 200 kg or 4 bags per hectare.
- â Apply C.A.N 150 kg or 3 bags per hectare, 5–6 weeks after planting.
- â Apply N.P.K 15:15:15, 100 kg or 2 bags, 6–7 weeks after planting.
- â Apply farm yard manure/poultry dropping (organic manure) as side dressing by broad casting.

The maize grains are exposed to rain and diseases.

Control:

- â Early harvesting.
- â Use scarecrows to scare birds.
- â Use of traps.

Grasshopper: *Zonocerus variegatus*

They eat up the vegetative parts of the plant.

Control:

- â Hand picking and crushing.
- â Spray with contact chemicals, e.g., Endosulfan pyrethroid.

DISEASES

Maize streak: (viral disease)

Causal organism: maize streak virus.

Mode of transmission: piercing and sucking insects as vectors.

Symptoms: Yellow streaking appear on the leaves parallel to veins of the leaves this retards plant development.

Prevention and control:

- â Remove, burn or bury affected plants.
- â Hand picking and destroying the vector insect.
- â Early planting.

â Use of resistant varieties.

â Use of insecticides on vector insects.

Maize smut: (fungal)

Causal organisms: *Ustilago zeae*

Mode of transmission: Airborne spores are deposited on the leaves, stem and tassels forming cobs.

Symptoms: Initially leaves appear white but later turn black

â Plants become dwarfish.

â The leaves, stems, tassels and cobs form out growth of black spores which burst to release black powdery spores.

Prevention and control:

â Spray with chemicals that contain sulphur.

â Crop rotation.

â Uprooting and burning of infected plants.

â Treat seeds before planting.

Maize rust: (fungal)

Causal organism: *Puccinia polyspora*

Mode of transmission: Airborne spores deposited on the leaves.

Symptoms:

â Red or brown spores appear on the leaves.

â Loss of chlorophyll and poor grain harvest.

Prevention and control:

â Use resistant varieties.

â Spray with recommended fungicides.

â Crop rotation.

â Good crop spacing.

Leaf spot: (fungal)

Mode of transmission: Airborne spores deposited on leaves.

Symptoms: Spotting of the lower leaves which initially look reddish brown but later turn dark brown. Total defoliation of the plant

Prevention and control:

â Use resistant varieties.

â Crop rotation.

â Use of recommended fungicides.

Rice

Rice is an important food item in most parts of the world because it forms the basis of diet of about half the population of the world. It can thrive on dry lands, in completely submerged land (swamp) and in fresh waters.

Scientific name: *Oryza spp.*

Asian rice - *Oryza sativa*

African rice - *Oryza glaberrima*

Common name: Rice

Local names: Iresi (Yoruba), Osikapa (Ibo), Shinkafa (Hausa)

VARIETIES Toma, BG 79, GFB 24, ITA 306, Cisadane, OS6, Ofada, Oshodi, TOG 772, Nerica and rice.

CLIMATIC AND SOIL REQUIREMENT

Temperature: 20°-30°C

Rainfall: 75-250 cm

SOIL REQUIREMENT

Upland rice: Can grow well in both acidic and alkaline soils. It can grow well on hills, flat land or valley so far as the land is wet.

Swamp rice: it grows well in waterlogged soil, rich heavy clay soil that can hold a lot of water during the growing season. It can also grow well along river banks and the soil should be acidic.

Land preparation: Land is cleared using hoe and cutlass. It is properly tilled with hoe. Where machineries are available it is ploughed and puddled or harrowed.

METHODS OF PROPAGATION

Rice is propagated by seed or seedling.

Planting date

Southern Nigeria - April to July

Northern Nigeria - May to September

Seed rate: 65 kg per hectare at 2/3 seeds per hole.

Spacing: Transplanting 1/2 seedlings per hill.

Range from 20 Å— 20 cm, 25 Å— 25 cm or 30 Å— 30 cm depending on variety.

Germination: 5-7 days.

Transplanting: 3/4 weeks of growth in the nursery.

CULTURAL PRACTICES

Supplying: Seeds/seedlings that fail to establish are replanted,

Thinning: Thin where necessary.

Manuring/fertilizer application: 80 kg N-basal; 50 kg N; 40P2O5; 40K2O in two splits at first and second weeding.

Maturity: 3-7 months depending on variety.

Weeding: Three times weeding is required before the harvest. Weeding is done using hoe manually, or hand pulling.

Harvesting: Rice stems are harvested using sickle or scythe or a combine harvester when the head matures and turns yellow.

Processing: After harvesting the rice, it is dried and threshed. The rice is parboiled a little and left for the steam to warm it up. The rice is parboiled to reduce the breakage of the grain and also to help remove the husk. The boiling also helps the rice to absorb some of the vitamins in the bran. The paddy can be boiled for 8-10 hours. After parboiling spread on mat to dry. After drying they are packed and taken to the mill where they are milled. The milling helps to remove expanded husk. This is called hulling.

Polishing: It is a process of removing protein-rich aleuron layer (bran) from the rice grain in order to make it appear white. It also involves the removal of vitamin B which when such rice is taken in large quantity will result in a malnutritional disease known as beri beri.

PESTS

Weevils: The insect is dark or black in colour with long piercing mouth parts. It is a field storage pest. They bore holes in the grain and then lay their eggs in the cavity and seal it up. The eggs develop into larvae and pupate leaving small holes on the grains. They leave powdery residue reducing the quality of the grain.

Control:

â Fumigate store with phostoxin tablet.

â Spraying the farm with chemicals.

â Dust with Actelic.

â Store in air tight container with fumigant.

Birds: They are also field pests. They eat up matured grains in the field, e.g., weaver birds,

Control:

â Setting of traps.

â Early harvesting of rice.

â Erecting a scarecrow to scare the birds.

â Employ bird scarers.

Rodents: They are field and storage pests. In the field cane rats and grasscutters eat the plants and seedlings in the field leading to great losses. When the grains are stored, they bore into stored grains and eat them up.

Control:

â Setting traps.

â Store in rat proof stores.

â Fence around the farm.

Stem borer: *S. calamistis*, *Chilo sp.*, *Maliarpha sp.*

They bore holes on the stem of the rice and eat up some part of the leaves.

This causes breaking and dislodging of the rice plant.

Control:

â Remove and burn infected plants.

â Hand picking the larvae.

â Apply systematic insecticide such as Furadan.

DISEASES

Rice blast: (fungal)

Causal organism: *Piricularia oryzae*, *Oryzae sp.*

Mode of transmission: Airborne spores

deposited on the leaves and stem.

Symptoms:

â The leaves develop brownish longitudinal spots.

â Darkening on the nodes.

â Breaking of stem from the nodes

Prevention and control:

â plant resistant varieties.

â uproot and burn infected plants.

â use well decomposed compost manure.

â treat seeds with fungicides before planting.

Rice smut: (fungal)

Causal organism: *Tilletia lorruda*

Mode of transmission: Airborne spores deposited on the leaves and stem.

Symptoms: Grains are converted to a black mass spores.

Prevention and control:

â Uproot and destroy infected plants.

â Use resistant varieties.

Leaf spot: (fungal)

Causal organism: *Cercospora oryzae*

Mode of transmission: Airborne spores deposited on leaves and stems.

Symptoms: Dead, brown, narrow spots on leaves and leaf sheaths.

Prevention and control:

â Use resistant varieties.

â Treat seeds with fungicides.

USES OF RICE

â It is principally used as food for man.

â The bran produced after hulling is used in feeding livestock.

â Manufacture of starch.

â Oil extracted from rice is used in making soap.

â Its straws are used in making hats.

â It is also used in brewing industries in making drinks.

â Straws can be used as bedding materials in animal house/pen.

17.3.2 Pulses (Grain Legumes)

Legumes are species of plant that have nodules in their root hairs and are able to fix atmospheric nitrogen. They bear pods and belong to the family Fabaceae. Legumes are rich in proteins. Examples are:

Cowpea (*Vigna unguiculata*)

Groundnuts (*Arachis hypogaea*)

Soya beans (*Glycine max*)

Pigeon pea (*Cajanus cajan*)

Bambara groundnut (*Vigna subterranea*)

Cowpea

Botanical name of cowpea is *Vigna unguiculata*

Common name: Cowpea

Local Names: Ewa (Yoruba), Agwa (Ibo),

Wake (Hausa)

Varieties: Mala, Kano white, Nigeria B7, Ayi, kudi, Alabama, Ife brown, Ife

Bimpe.

CLIMATIC AND SOIL REQUIREMENT

Temperature: 27°-35°C

Rainfall: 60-125 cm

Soil requirement: Sandy loamy soil.

Land preparation: The farmland is cleared using cutlass manually and machines are used mechanically. Stumping is followed by ridge-making. Then the land is ploughed and harrowed.

Method of propagation: Use of seeds.

Planting date:

South - April to May

North - July to August

Seed rate: 20-25kg, per hectare at 2/3 seeds per hole.

Germination: 4/5 days after sowing.

Spacing: 1 m – 30 cm as sole crop 90 – 30 cm between plants.

Sowing depth: 1.5-2.5 cm.

CULTURAL PRACTICES

Supplying: Ungerminated plants are replaced 7-9 days after planting.

Thinning: Thin down to 2 plants per stand within two weeks to five weeks.

Manuring/fertilizer application: Not applicable except where necessary.

Weeding: Weeding should be carried out three times before harvesting.

Maturity: 2-4months (60-120days).

Harvesting: Handpicking or by cutting with beat cutter when the pod is mature and ripe before shattering.

Drying: Dry pods under the sun after harvesting.

Shelling: Pods are beaten with sticks or clubs, after packing it in jute bags. The shell is removed by winnowing.

USES

(i) It is widely eaten in various forms as boiled whole beans, mixed with corn, rice, millet, ground and fried as bean cakes (akara) or steam moulded in tins or leaves (moin moin).

(ii) The soft immature leaves are eaten as vegetable by man.

(iii) The vegetative parts are also used in feeding livestock.

(iv) The hulm is used in feeding livestock.

PESTS

Cowpea seed beetle: The seed beetle is both field and storage pests. The pest is *Callosobruchus maculatus*. It bores hole into the seed leaving behind powdery residue which reduces the weight, market value and they impact some offensive odour.

Control:

â Fumigate the seeds with phototoxin tablets.

â In the field spray with chemicals like lamdacyahalothrin (karate).

â Early harvesting.

Rodents and Birds: Bush rats and rabbits damage crops extensively at the fruiting stage. Bush fowl damage germinating seeds.

Control:

â Setting traps

â Early harvesting

Pod borers: The mature adults bore hole in the stem and seed, injecting toxic saliva.

Control:

Spray with insecticides such as furadan, agroton.

Leaf hoppers: (*Empoasca sp.*)

They attack the leaves in the field, causing stunted growth and low yield.

Control:

Use of insecticides.

DISEASES

Damping off: (fungal)

Causal organisms: *Pythium spp.* And *Phytophthora spp.*

Mode of transmission: Soil borne spores through hyphae.

Symptoms:

â Disintegration of the seedling tissues.

â Death of plant.

Control:

â Dusting seed with fungicides before planting.

â Planting resistant varieties.

Groundnut

Scientific name: *Arachis hypogaea*

Groundnut is a type of legume with seed rich in oil (48-49%) protein about 26%.

Common name: Groundnut

Local names: Epa (Yoruba), Opapa (Ibo),

Cyada (Hausa)

Varieties: Samaru 61, G153 runner-Ds 569, T37-47, Kano 50, Castle cary, Valencia and Spanish varieties.

CLIMATIC AND SOIL REQUIREMENT

Temperature: 25°-40°C.

Rainfall: 70-125 cm.

Soil requirement: Rich sandy loamy soil, light sandy soils which allow good drainage.

Land preparation: Clearing of land using matchet. In commercial farms machines are used to clear and stump. Make ridges manually. Where machines are used the land is ploughed and harrowed.

Method of propagation: By seeds.

Planting date:

South - March-April

North - May-July

Seed rate: 40-90kg per hectare.

Germination: 4 days (shelled seed).

Spacing:

â Shallow ridges 20-30 cm.

â Light ridges 90-150 cm apart.

â 15 cm between seed.

â 40 or 60 cm.

Sowing depth: 1.5-2.5 cm.

CULTURAL PRACTICES

Supplying: Ungerminated seeds are replanted 7-9 days after planting.

Thinning: Where there are more plants it can be thinned down to two.

Manuring/fertilizer application: Farm yard manure or compost is worked into the soil during cultivation preferably.

Weeding: Early weeding is recommended 2-3 weeks after planting. There should be regular weeding and loosening of the soil until flowering.

Flowering: 6-7 weeks after planting.

Maturity: 4-5 months (120-150 days) after planting depending on variety.

Harvesting: Harvest when the leaves turn yellow. Harvesting is carried out by opening up the beds/ridges manually and pulling the plants and collecting the pods.

Processing and storage: The pods are sundried after which they are shelled with hands or machines.

â Seeds are stored in jute bags.

â Seeds can also be stored in silos.

â They can be stored in rhumbus and should be treated with appropriate insecticides.

â They can be processed to extract pure groundnut oil and leaving the groundnut cake.

USES

â It is used as food for man and feed for animals (fodder, groundnut cake).

â Extraction of oil (groundnut).

â Source of raw materials for making soap and margarine.

â It is an export crop that yields revenue.

â The tops after harvesting are used in silage making or hay.

PESTS

Termites: *Macrotermes natalensis*

Damage occurs at the time when the pod is ripening. Termites scar the pods with their powerful mandibles, eating up the kernel and exposing them to infestation.

Control:

Fumigate the soil using carbon disulphide.

â Good sanitation

â Removal of hulls and thrash after harvest

Millipedes: They attack the seeds underground. Developing pods are attacked, exposing the kernels.

Control:

Early harvesting

Groundnut Bruchid: This beetle is associated with groundnut shells. The adult damages the shells, the female lays its eggs on the surface of the pods. After hatching they eat up the kernels.

Control:

Handpicking

Destroy insect vector.

DISEASES

Rosette disease:

Causal organism: Virus (*Aphis craccivora*)

Mode of transmission: Insect borne

Symptoms: Leaves become chlorotic with dark veins

â Extreme shortening of the internode and petiole

â Reduction in size of the leaflets

â Complete loss of harvest

Prevention and control:

â Use resistant varieties.

â Early planting

â Destroy and burn infested plants.

â Crop rotation

â Spraying with insecticides such as systemic insecticides.

Tikka disease: (Fungal)

Causal organism: *Cercospora spp.*

Mode of transmission: Airborne spores deposited on the leaves.

Symptoms:

â Yellowing of the leaves

â Leaf defoliation

â Falling off leaves

Prevention and control:

â Dressing the seed with fungicides before planting

â Crop rotation

â Early planting

â Farm sanitation

17.3.3 Roots and Tubers

They are plants which develop swollen underground tubers or roots which

are edible. They contain a lot of carbohydrates.

Yam is an example of root crop that has an underground stem, while cassava has a tuber which does not have buds like yam.

Scientific name: *Dioscorea spp.*

Common name: Yam

Local name: *Isu (Yoruba), Ji (Ibo), Doya (Hausa)*

Temperature: $25^{\circ}\text{A} - 30^{\circ}\text{C}$

Rainfall: 100–180 cm per annum and sufficient sunlight.

Soil: Well-drained sandy loamy soil.

Land preparation: They require thorough land preparation for easy penetration of the tubers. They are heavy feeders which require high nutrients. After clearing and stumping, holes are made on flat land. They can also be planted on ridges. The land is also ploughed and harrowed before making holes in commercial farms.

Method of propagation:

â Use of whole yam tuber/seed yam

â Yam setts

â Yam mini-setts

Planting date:

Early yam: September to December

Late Yam: March to April

Seed rate: 2–5 tons per hectare depending on the size of setts and spacing.

Germination/sprouting: 20–60 days depending on rainfall but may take longer for early yam.

Spacing: 100 Å—100 cm

90 Å—100 cm

25 Å—100 cm mini setts

Sowing depth: Holes, 15 cm deep, are dug on top of the heaps or ridges and one sett is placed in each hole usually with the cut surface upward and sloping at 45° . The setts are covered with at least 8 cm and not more than 16 cm of soil. Dust all yams before planting. Cover the heaps after planting with mulches.

CULTURAL PRACTICES

Supplying: Yams that do not sprout are replaced.

Manuring/Fertilizer application: Apply N.P.K fertilizer 20:20:20 of about 200 kg (4 bags) per hectare, where fertilizer is not available farmyard manure or compost can be used at 20–25 metric tones per hectare.

Weeding: Weeding should be carried out as from three weeks of planting to reduce weed competition with crops for nutrients.

Staking: Staking is essential for good yield. It is carried out when the vines are long enough to need support. In some localities light and heavy staking materials are used. The light stakes (leading sticks) are used to train the individual vines so that they are supported by a heavy and tall stake which may support 3 or 4 light ones at the centre. Where mounds of big sizes are involved staking is not necessary. Training of yam vines is necessary it helps them climb to the stakes properly. It is done anticlockwise that is from right to left. When yam vines are trained it helps to expose the leaves for photosynthesis and to protect them from insect attack and scorch of the sun.

Maturity: 8-12 months depending on varieties.

Harvesting: It is carried out when the leaves almost turn brown, with the cracking of the heaps or mounds. The whole yam tuber is dug out using hoe, matchet and dibber.

Storage: The traditional yam barn is still perfectly used for storing yam. The barn is station in cool place with grass as protector from sun. The tubers are tied according to their sizes. The tubers are inspected frequently for signs of decay and early sprouts are rubbed off. Yam can be stored in dried, peeled yam flakes. They can also be stored in flour form.

USES

â Yam is grown principally as food for man.

â Some yams that are not edible are used for hunting and preparing bait for catching animals/fishes.

â Some varieties of yam are also used for medical purposes.

â Saponins are chemicals extracted from yam. It has foamy lather and can be used as detergents and shampoo.

â Large quantities of starch can be extracted from yam.

â Yams are planted as ornamentals.

â Yam peels can be used for feeding livestock.

PESTS

Yam tuber beetle: This is a serious insect pest which bore holes on yam. The holes it bores on the tuber makes the yam unattractive and can lead to fungal infection.

Control:

â Dusting with recommended insecticide before planting (dieldrine, BHC)

â Crop rotation

â Late planting may reduce the attack of yam beetle.

Yam shoot beetle: The larva of beetle feeds on the developing shoot. They are surrounded by film of frothy slime. This will prevent further development of the plant.

Control:

â Handpicking

â Dust with Agrocide 3 powder

Nematodes: When they attack the yam they form ball-like structures all over their body.

This either decays the tuber or makes it unsuitable for consumption. The affected tuber cannot develop well since it cannot store starch.

Control:

â Crop rotation

â Use of clean planting materials

â Farm sanitation

Rodents: Rats and grasscutters eat up the tubers in the field and store.

Control:

â use of traps

â Clearing bushes around the farm

Yam mosaic:

Causal organism: Virus

Mode of transmission: piercing and sucking insects

Symptoms:

â Stunted growth

â Leaf curl and distortion of veins

â Chlorosis

Prevention and control:

â Crop rotation

â Use of resistant varieties

â Use of insecticides to kill insect vectors.

Yam Rot:

Causal organism: Nematode (*Anguilliuna brodys*)

Mode of transmission: Through infestation of eelworm, which later follows fungal infection

Symptoms:

â The tuber turns brown in colour and later becomes soft.

â Emission of pungent smell with white brownish liquid.

Prevention and control:

â All infected yam should be destroyed.

â Apply aldrine dust or chlordane dust.

â Crop rotation

Leaf spot:

Causal organism: Fungal (*Cercospora spp.*)

Mode of transmission: Airborne spores are deposited on the leaves.

Symptoms:

â Stunted growth

â Leaf chlorosis

Prevention and control

â Practice crop rotation

â Spray with fungicides.

Cassava

Cassava is a root tuber in the family Eupobiaceae. It is principally grown for its root tubers, being a major staple carbohydrate food for an estimated 500 million people. As of today cassava has assumed the status of a âœpure goldâ€, a powerful poverty fighter based on its transformation to a major cash crop.

Scientific name: *Manihot spp.*

Common name: Cassava

Local names: Ege (Yoruba), Akpu (Ibo), Rogo (Hausa)

VARIETIES

TME 419

TMS 97/2205

TMS 98/0505

TMS 98/0510

TMS 0581

CLIMATIC AND SOIL REQUIREMENT

Temperature: 250-290 C

Rainfall: 150-200 cm per annum

Soil requirement: Sandy loam with medium fertility.

Land preparation: Clear the land manually. Stump, making of mounds, ridges/flat.

Mechanically plough and harrow properly, then make ridges.

Method of propagation: stem cuttings

Planting date:

South Early planting March-May

Late planting August-September

North: June-August

Germination/sprouting: 7-14 days

Spacing: 100 Å— 100 cm

60 Å— 100 cm

Stem cuttings: 40-66 tonnes per hectare

Length of cuttings: 15-20 cm

Method of planting: Vertical planting

Horizontal planting

Inclined planting

Planting depth: For inclined and vertical planting, the stem cutting should be placed in the soil with 2-4 nodes above the soil.

CULTURAL PRACTICES

Supplying: Three weeks after planting, cuttings that fail to sprout are replanted.

Manuring/fertilizer application: N.P.K

20:10:10 at 400-600 kg per hectare N.P.K

12:12:17 at 400-600 kg per hectare.

Manure: 2000-4000 kg poultry manure are applied per hectare.

Weeding: 3-4 months, weed manually.

Herbicides such as Diuron at the rate of 2-3 kg active ingredient per hectare.

Harvesting: Manual harvesting using hoe and machets. Cut the stem 30-45 cm above the ground, the handle helps in pulling the cassava out after which the remaining cassava in the soil are dug out with hoe and machets.

Use of mouldboard plough.

Storage: Cassava does not store well except in processed form.

USES

â Use of cassava as food-fufu, gari, flour, flakes, tapioca, bread, biscuit and cake.

â Cassava in livestock feed industry-cassava chips, cassava pellets, cassava root meal, cassava peel, cassava ensilage and cassava foliage flour.

â As industrial raw materials, starch, vitamins, ethanol, glue, gum, binder and adhesives.

â Use of cassava as manurial product.

â Cassava peels can be used for feeding livestock.

â Cassava refuse or waste from distilleries.

â Use of cassava as fuel wood.

â International earnings: foreign exchange

PESTS

Grasshoppers: Grasshoppers- *Zonocerus variegatus*. They feed on the leaves, young tender barks, leading to defoliation of the plant.

Control:

â Use of resistant varieties

â spray with vetox 85

Cassava mealy bug: Cassava mealy bug - *Phenacoccus manihoti* attacks the terminal point of cassava shoots, petioles and expanded leaves. It sucks the sap and it introduces toxic chemical with the saliva causing stunted growth. Leaf curling and massive leaf defoliation.

Control:

- â use of resistant varieties
- â Use of wasp that feed on the bug (biological control)
- â Use ultracide to treat the cuttings.

Termite: Coptotermes spp.

Termite constitutes a serious pest of cassava in Nigeria. They eat up the stem cuttings. At times, they attack the roots, swollen roots and the growing points.

Control:

Treat cuttings before planting with ultracide 40 E.C, alternatively, dust cuttings with aldrin dust.

- â Good field inspection sanitation
- â Regular field inspection at establishment.

Rodents: Grasscutters and rats eat up the root tubers and stem.**Control:**

- â Fencing the farm
- â Use of traps
- â Regular inspection of the farm

DISEASES**Cassava Mosaic Disease (CMD):**

Causal agent: Cassava mosaic virus

Mode of transmission: Transmitted by white flies, *Bemisia tabaci*

Symptoms: Chlorosis in both young and old plants.

- â Deformation and distortion of leaves
- â Reduction in leaf area
- â Stunted growth.

Prevention and control

- â Use resistant varieties
- â Crop rotation
- â Adopt sanitation approach use of healthy stem
- â Control of the insect vector
- â Uproot and burn infected plants

CASSAVA BACTERIAL BLIGHT (CBB)

Causal organism: *Xanthomonas campestris*

Mode of transmission: Through infected stem cuttings, contaminated tools.

Symptoms:

- â Presence of water-soaked grey angular spots
- â Wilting of the shoots and branches
- â Gum exudates on the stem
- â Die back and necrosis of the vascular strands of the stems and roots

Prevention and control:

- â Use of improved varieties
- â Use of uninfected cuttings
- â Avoid bush fallow around cassava plantation.
- â Prevent movement of people, tool, machinery from infected field brown.

BACTERIA LEAF SPOT (BLS)

Causal agent: Fungus (*Cercospora spp.*)

Mode of transmission: Airborne spores that are deposited on the leaves

and stem.

Symptoms:

- â Angular, uniform brown spots on both sides of the leaf.
- â Margins of the spots are well defined and dark.
- â The leaves become yellow dry and fall off.
- â Defoliation can be severe towards the end of the raining season.

Prevention and control:

- â Use resistant varieties.
- â Use of Benlate or Dithane M-45 at the rate of 1.5 kg active ingredient per hectare.
(1.5 kg ai/ha)
- â Crop rotation
- â Farm sanitation

CASSAVA ROOT ROT (CRR)

Causal organism: *Phytophthora spp.*

Mode of Transmission:

- â Airborne spores deposited on the stem and leaves.
- â Severe defoliation and soft rot of swollen roots.
- â Infected swollen roots turn brown.
- â The roots often exude a characteristic pungent watery liquid and eventual decomposition.

Prevention and Control

- â Improve resistant varieties
- â Select light soil
- â Ensure good drainage
- â Crop rotation
- â Early harvesting to reduce root rot.

17.3.4 Vegetables and Fruits

Vegetables are those edible portions of herbaceous plants which are annuals or perennials. They can be eaten raw or in cooked form. Vegetables are highly perishable due to their high water content. They serve as roughage promoting digestion and good bowel movement. They are also rich in vitamins. Many of them are quick growing crops and may have a life span as low as three months. Examples include okra, tomatoes, fluted pumpkin, bitter leaf and water leaf. There are three methods of raising vegetables namely- Backyard garden, intensive garden, and extensive vegetable farming. A Fruit is a well developed and ripened ovary or a collection of ovaries, often with adjacent floral parts or other plant parts. They contain a lot of vitamins. They can be eaten raw without any processing or they can be processed and stored for a long period. Examples are mango, citrus, paw-paw, pineapple, guava and avocado pear.

Vegetable

Fluted pumpkin is cultivated mainly for its succulent young shoots which are used as vegetable and its seeds. It is also referred to as cucurbits.

Fluted pumpkin - *Telfairia occidentalis*

Yoruba - Elegede

Ibo - Ugu

Efik - Ubong

CLIMATIC AND SOIL REQUIREMENT

Temperature: 16Â°-32Â°C

Rainfall: 1200-2500 mm per annum.

Soil: Well-drained sandy loam soil

Land preparation: The land is cleared and stumped manually. Mechanically the land is ploughed and harrowed before the ridges are made.

Method of propagation: By seeds

Planting date: March-April

Germination: 7-14 days

Spacing: 160 Å— 100 cm between and within row.

Sowing depth: 12-15 cm.

Maturity: 4 weeks-11/2 years

The shoots are ready for harvest some weeks after planting. At times the fruit is allowed to develop and mature for harvest.

CULTURAL PRACTICES

Supplying: Three weeks after planting, seed that did not germinate are replanted.

Manuring/Fertilizer application:

Fertilizer: N.P.K 10:10:10

Use of Urea Sulphate of ammonia

Manuring: poultry/farm yard manure is used.

Weeding: The farm should be weeded at least twice before the plant starts establishing.

Staking: Once the shoots start producing climbers, they are directed to the stake to help expose them to sunlight and protection from heat of the sun and insect attack. **Harvesting:** The shoots are trimmed with sharp table knife, leaving an internode for continuous production. The harvesting is all year round. The fruits ripen in August to September.

Processing and storage: The leaves are stored in a refrigerator for short periods. In

the North the leaves are dried.

USES

â Food for man and animals, supplying vitamins and minerals.

â It is a source of income.

PESTS

Grasshoppers: They eat off the leaves causing losses to farmers.

Prevention and control

â Handpicking of the pest

â Spraying with insecticides karate 25EC.

Tomato

Tomato is an annual crop. It is cultivated for its fruits. It belongs to the family Solanaceae. They are perishable and do not stand long stress. It flowers after which the fruits are formed. The fruits are berry and greenish in colour to red. The leaves are highly scented. The fruit is succulent and consists of the epicarp, the mesocarp (red fleshed) and the endocarp which contains the seeds.

Scientific name: Solanum lycopersicum

Common name: Tomato

Local name: Tomaati (Yoruba), Afufa (Ibo), Tomati (Hausa)

VARIETIES/TYPES

Money maker, valiant, Ife plum, Roma Pork and dwarf gem.

CLIMATE AND SOIL REQUIREMENT

Temperature: 20°–25°C

Rainfall: 50 -125 cm with high sunlight

Soil: Well-rained sand loamy soil

Land preparation: Bush is cleared with cutlass and hoe. Then there should be stumping of the areas. Ridges or beds are made mechanically by ploughing, harrowing and ridging.

Method of propagation: Use of seed, drill and broadcasting of seeds.

Planting date:

North - September-October

South - March-April

Seed rate: 5 -10 kg of seed per hectare

Nursery: Seeds are planted in boxes or trays on loamy soil. Watering and weeding should be carried out where necessary. The nursery plant should be shaded with palm frond.

Transplanting:

â When the seedling has 4 -5 leaves

â When the seedling is of height of 15-20 cm

â When the seedling is about 4-6 weeks

â Transplanting should be carried out early in the morning or late in the evening.

Spacing: In the field, 60 – 75 cm for staked, 60 – 90 cm unstaked

Sowing depth: 10 -12 cm.

Maturity: 3-4 months

CULTURAL PRACTICES

Manuring/Fertilizer Application: N.P.K 15: 15:15, 50 kg per hectare, sulphate of ammonia, 28 kg per hectare

Manuring: The plant should be mulched and application of organic manure.

Staking: Once flowering starts the plant should be staked using staking materials such as sticks, strings, or twine. This will reduce the incidence of fruit rot and the plant crawling on the ground.

Weeding: Weeding should be done regularly with hand or hoe.

Harvesting: When the fruit turns reddish yellow about 8 -10 weeks after planting. Tomatoes to be transported to far distance are harvested when they are fully matured and green. They are packed in baskets.

USES

â It is food especially in cooking different dishes.

â It is raw materials for paste production industries.

PESTS

Caterpillars: They eat up the leaves, reducing photosynthetic activities, resulting in low yield.

Control:

â Handpicking

â Spray with chemicals such as karate.

Cricket and Grasshoppers: The grass hoppers feed on the leaves, while the crickets in addition eat up the stem of seedlings.

Control:

â Handpicking the crickets

â Use chemicals like vetox 85 against grasshoppers.

Worms: They bore hole on the fruit causing decay and loss in market value of the crop.

Control:

Use insecticides like vетox 85

DISEASES**Root knot:**

Causal organism: Nematode

Mode of transmission: Soil borne nematode

Symptoms:

â Formation of galls on the roots which prevents absorption of water and nutrients by plants.

â Retarded growth and wilting

â Bearing of few fruits

Prevention and control:

â Practise crop rotation.

â Fumigate the soil with nematicides such as Nemagon 20.

â Use resistant varieties.

â Uproot and destroy infected plants.

Leaf spot: (fungal)

Causal organism: Cladosporium spp.

Mode of Transmission: Airborne spores are deposited on the leaves

Symptoms:

â Dead spores appear on the leaves.

â Circular white patches on the leaves.

Prevention and control:

â Crop rotation

â Use of resistant varieties

â Use of fungicides-Bordeaux mixture

Mango

Botanical name - Mangifera indica

Yoruba - Mangoro

Ibo - Mangolo

Hausa - Mangor

VARIETIES Julie, Alphonsom, Palmer, Edward, Zill, Early Gold, Saigon.

CLIMATIC AND SOIL REQUIREMENT:

Temperature: 25°-35°C

Rainfall: 75-125cm

Soil: Fertile soil

Land preparation: Clearing of the bushes manually or mechanically. The land is ploughed and harrowed.

Method of propagation:

â Seed

â The better varieties are patch budded on them

â Grafting

Planting date: Any time of the year.

Spacing: 10 Å— 10 m

8 Å— 8 m

6 Å— 6 m

Raising root stock: Mango stones are collected in the month of May to June; they are scraped and soaked in water for 24 hours. The decorticated seeds are sown in pre-nursery beds that are partially shaded. The seeds germinate and emerge fully within 2-3 weeks. About

10 days after full emergence, the seedlings are lifted and their tap root severely pinched and then planted in the nursery between June/July at 6–6 m. The root stock seedlings would be ready for grafting in October to November.

Technique of veneer grafting: Veneer grafting involves selection of proper scions which are collected from mature and healthy trees and their activation. The scion material consists of 3-4 months old shoots whose leaves are pruned off while they remain intact on the parent tree and carrying the terminal and distal auxiliary buds.

Germination: 2-3 weeks.

Fruiting: 4-6 years yield: 500-2000 fruits fully grown: 10-20 years.

PESTS

Fruit flies and moths: They attack ripe and near ripe fruits.

Control:

- â Harvest regularly.
- â Destroy all overripe fruits.

DISEASES

Anthracrose: Fungi

Causal Organism: Gloeosporium mangiferae

Mode of transmission: Airborne spores on the leaves, stem and fruits.

Symptoms:

- â Spotting of the fruits
- â Shedding of the young fruits
- â Attack on the leaves.

Prevention and control

- â Plant sanitation
- â Spray with fungicides

17.3.5 Beverages and Spices

Cocoa

Cocoa is indigenous to Central and South America with large variation been found in Amazon. Development has helped to establish this crop in some west African countries. The cocoa grown in Nigeria and Ghana is a type of forastero known as Amelonado. It is roundish, smooth or slightly ridged pods, green when immature and yellow when ripe.

Botanical name: Theobroma cacao

Yoruba - Koko

VARIETIES/TYPES Forastero-Amelonado, Criollo , Trinitarion, Amazon

CLIMATIC AND SOIL REQUIREMENT

Temperature: 15°-20°C.

Rainfall: 125-200 cm per annum

Soil requirement: Deep fertile, well-drained loam soil, soil must be loose and friable and will retain moisture especially during dry season.

Land preparation: The land is cleared with machete or harrow. Cocoa can be planted on flat land.

Method of propagation:

- â Seed
- â Budding and leaf cuttings.

Planting date:

Nursery: December-January

Transplanting: April-June.

Spacing: Nursery: 20 Å— 20 cm. Field: 3 Å— 3 m.

Nursery:

â Rich loamy forest soils are collected

â Filled into a polythene bags with perforation to make room for flow out of excess water.

â Plant seed 3 cm deep in polythene bags.

â The seeds are watered daily either in the morning or in the evenings of every other day.

Germination: 7-10 days.

â Provide shade to protect the plants like planting of bananas.

â Regular weeding.

â A week before transplanting, seedlings in the seed beds should be dug in situ in order stimulate the initiation of new roots.

Transplanting: Transplanting is carried out from late May to early June; crops like cocoyam and plantain are planted to provide shades.

Maturity: 3-5 years

CULTURAL PRACTICES

Weeding: Weeding should be done regularly. Use herbicide such as Simazine, Aminotriazole and Paraguat. Supply the missing stands after the first raining season.

Mulching: Mulch at onset of dry season.

Pruning: Cut off unwanted branches to encourage better canopy formation. Proper pruning helps high penetration.

Manuring and fertilizer application: Urea or sulphate of ammonia is applied 3000 kg per hectare. Apply 8 -12 weeks after planting.

Flowering : Cocoa trees flower two years before the stems become strong enough. Such flowers must be removed in order to avoid possible pods as the plant will be weakened if they are allowed to carry such pods.

Harvesting: Harvesting of cocoa begins from August-January. Ripe pods always change colour from green to yellow and they sound hollow when tapped. During harvesting care should be taken so that one will not damage the flower cushion (or attachment of the pod to the parent plant). Future pods will develop from there. Sharp knife and sickle are used for harvesting. Harvesting should be done once the pod ripens to avoid seed germination inside the pod.

Processing: After harvesting, the pods are packed and carefully opened with a blunt cutlass or by hitting them with heavy rod to remove the cocoa beans. The seeds are later collected and put in basket.

Fermentation: There are three methods of fermentation. They are:

â Heap fermentation

â Sweat box fermentation

â Tray method of fermentation

During fermentation the cocoa beans undergo a chemical change brought about by action of heat. The cocoa bean will change to red brown colour and develop the characteristic chocolate flavor. Theobromine is one of the properties in cocoa that gives it stimulant property. Drying: The beans are dried in the sun either on raised platform or concrete slab.

Cocoa beans should not be dried on bare ground as this will lower the quality and result in contamination. After drying, the beans are allowed to cool before bagging them. Bagging should be done in the evening. After bagging

they are transported to licensed buying agents for grading, weighing and purchasing.

Storage: Cocoa beans should be stored in clean baskets or new sacks. The baskets and sacks are kept off the ground to avoid contamination.

Grading: Cocoa is normally graded before selling them. The grades are Grade 1 less than 3 percent mouldy beans. Less than 3 percent slaty beans, less than 3 percent other defects.

Grade 2: Less than 5 percent slaty beans, less than 5 percent mouldy beans, and less than 5 percent other defects.

PESTS

Capsid: The main pest of cocoa is capsid (*Distantiella theobroma* and *Sahlbergella singularis*).

They suck the sap of young cocoa shoot and the cocoa pods. They cause a lot of damage and injury to the plant. They also cause the drying and splitting of the bark of cocoa trees. They cause the death of leaves and puncture the pods.

Control:

Spraying with BHC and Disimac 25

Mealy bugs: They are tiny insects that feed on the cell sap of crops like shoots of cocoa.

Control:

Spray with insecticides Aldrex 40 or Agrothion.

DISEASES

Swollen shoot disease

Causal organism: Swollen shoot virus

Mode of transmission: They are transmitted by nymphs of mealy bugs.

Symptoms:

â Chlorosis

â Vein clearing with other tissues around them loosing their green colour.

â Swollen shoots and roots.

â Stunted growth

â Reduction in yield

Prevention and control:

â Destruction of infected trees

â Planting of resistant varieties

â Spray with insecticides to kill the vector

(mealy bugs)

Black pod disease:

Causal organism: fungus (*Phytophtora palmivora*)

Mode of transmission: Spores are spread by rainsplash. Soil borne hyphae can also attack pod.

Symptoms: Brown spores on fruits covered by soaked, powdery spores which makes the fruit rotten and turns it black

Prevention and control:

â Remove and burn all infected pods.

â There should be regular weeding of the farm.

â Spray with fungicides - Bordeaux mixture or perenox, Sandoz.

USES

â It is used in making chocolate.

â It is used as raw material for making - Ovaltine, Milo, Bournvita and

Pronto.

- â It is used to export to other countries of the world.
- â The pods can be used to provide ashes as a source of potash.
- â Cocoa butter is used in manufacture of cosmetics such as soap, ointment, food and drugs.

Pepper

Pepper is a spice which adds flavour to the food. It is rich in vitamins and minerals.

Botanical name: *Capsicum sp*

Yoruba - Ata

Ibo - Ose

Hausa - Barkono

VARIETIES

Capsicum annuum

Capsicum frutescens

C. annuum: An annual shrub that bears big and round fruits which are greenish when unripe but orange reddish when ripe.

C. frutescens: It is a perennial shrub that bears long narrow fruits which are also greenish in unripe state but reddish in ripe state.

CLIMATIC AND SOIL REQUIREMENT

Temperature: 16°-32°C

Rainfall: 1000 -2000 mm per annum.

Soil requirement: Sandy loamy

Land preparation: The land is cleared manually or mechanically stumped, ploughed and harrowed.

Method of propagation: seed

Planting: The seed is first raised in nursery beds in the first week of June they are ready for transplanting 3-4 weeks after planting at the height of 10 cm.

Germination: 7-10 days

Seed rate: 1.75 kg to 2.2 kg per hectare

Spacing: 20 Å— 30 cm

Sowing depth: 75-90 cm on ridges

Flowering: pepper flowers at 10-12 weeks after sowing.

Maturity: 14-16 weeks after sowing

CULTURAL PRACTICES

Weeding: Weed regularly to avoid competition with weeds.

Mulching: Mulch to conserve moisture.

Manuring/Fertilizer Application: N.P.K. 10: 15:10 and triple superphosphate 100 kg per hectare.

Harvesting: October to January is the usual harvest period. Ripe pepper can be harvested with hand or sharp knife.

Processing: The fruits are dried in the sun for 6-14 days depending on weather, fruits are thinly spread day and night and sweating should be avoided.

PESTS

Grasshoppers: They eat up the leaves of the crop plant.

Prevention and control

â Handpicking of the pests

â Apply appropriate insecticide, e.g., karate 2.5 EC.

Fruit-fly: (*Ceratitis capitata*) This species attacks the plants in large numbers, feeding on the fruit flesh and leaving only the transparent skins.

Control:

â Handpicking

â Use of insecticides

DISEASES

Leaf spot:

Causal organism: Fungus

Mode of Transmission: Airborne spores deposited on the leaves and stems.

Symptoms: Yellow to black spotting of leaves.

â Leaf fall

â Decay of flowers and leaves

Prevention and control

â Apply fungicides

â Use of resistant varieties

17.3.6 Oil, Latex and Fibre

Oil Palm

Oil palm is a native of tropical Africa and is found growing in forest river valleys. It is a single-stemmed plant growing to a height of about 8 m at maturity. The leaves or fronds are arranged spirally on the trunk and it has an extensive root system. The root possesses pneumatophores. The cells can store air and this enables the plant to withstand swampy conditions.

Male and female flowers occur on the same plant but are produced in different cycles. The fruits occur in bunches and each bunch contains up to 200 fruits.

Botanical name: *Elaeis guineensis*

Yoruba - Ope

Ibo - Nkwu

Hausa - Kwakwan manja

VARIETIES

Dura: This type has a large kernel (seed and endocarp) and a thin mesocarp

Tenera: This has a thick mesocarp, a small shell and fairly large seed.

Pisifera: It has no shell, little or no seed and very thick mesocarp. The best variety is Tenera because it produces large quantity of palm oil, fairly amount of seed.

CLIMATIC AND SOIL REQUIREMENT

Temperature: 20°-21°C

Rainfall: 152-177 cm per annum.

Soil Requirement: Well-drained deep sandy loam, overlaying clay soil that can easily be cultivated is ideal. Soil pH of 4.5-5.5 is required.

Land preparation: The land is cleared manually or mechanically. The land is stumped, ploughed and harrowed. The oil palm is planted on flat soil.

Method of propagation: Oil palm is propagated by seed raised through pre-nursery.

Germination: Germination of natural oil palm seed is very difficult. It is

necessary to heat treat the seeds so that they will all germinate together. First the seed is soaked for 7 days, changing the water everyday. The seeds are dried for at least 24 hours in the shade, spread out in single layers until their surface is black. Excessive drying must be avoided. The seeds should then be placed in 500 gauge polythene. 750 seeds are placed 60 Å— 60 cm. The seeds are removed and soaked for another seven days, changing the water on a daily bases.

Then dry the seeds until the shine produced by water disappears. The seeds are allowed to stay for 3 weeks after which there will be rapid germination.

Pre-nursery: Seed boxes or tray are filled with top soil rich in humus. The seeds are sown 7.5 cm apart at the depth of 2.5 m in 10 -15 cm sterilized soils. The trays are lightly mulched and water as condition warrants. The pre-nursery lasts for 41/2 months.

Nursery operation: A well-drained, loamy soil is required. The nursery is ploughed and

harrowed. Seeds are planted early April/ May. Spacing of 60 Å— 60 cm is utilised. The seeds are mulched, watered and weeds are controlled.

Transplanting: The seedlings are transplanted after one year. The recommended spacing is 9 m triangular, giving about 60 palms per hectare. The roots are trimmed to encourage the development of new ones.

CULTURAL PRACTICES

Supplying: Replace plant that fails to survive.

Manuring/fertilizer application: N.P.N 15: 15:15 at 800 kg per hectare, yearly application of potassium fertilizer is encouraged.

Weeding: Cutlass is used to cut all weed close to the ground in a ring of 1m radius from the base of the palm. Alternatively, herbicides can be used.

Maturity: Three to four years depending on the variety.

Harvesting: A bunch is ready for harvest when it has just a few loose fruits. Axes or cutlasses can be used, but this necessitates cutting off the leaf frond from the bunch. At times, sickle shaped harvesting knives on long poles are used. This requires cutting some fronds. When the palms grow too high, harvesting has to be done by climbing.

Processing: Oil palm can be processed in two ways.

(i) Traditional method: The bunch is chopped into sections with cutlass or axe. After 2-3 days the fruit starts to detach. The fruits are separated and put inside the drum of water and boiled for 35 minutes. The fruits are pounded in mortar. The whole pounded puff is poured inside water and washed thoroughly. The oil floats and the content is boiled. The oil is collected after boiling.

(ii) Modern Method: It involves the use of pressing machine to extract oil. The pounded puff as in the traditional method is put inside the pressing machine and pressed to extract oil. The oil is stored in cans and drums while the kernels are separated and cracked.

GRADE

They are graded based on the quantity of free fatty acids (FFA) present in the oil.

The three grades are:

- (i) Soft oil: It has low free fatty acid.
- (ii) Hard oil: It has high free fatty acid.
- (iii) Special oil: It has a very low fatty acid.

PESTS

Rhinocerous beetle: (*Oryctes spp.*)

It attacks oil palm and coconuts. It lays its eggs in oil palm trunks, stump and dung. The adult beetle burrows into the developing spear and damages the growing point in young palms.

Control:

- â Good sanitation
- â Destruction of felled palms and stumps by burning
- â Use of tall cover crops in young plants
- â Use of parasites and predators of *Oryctes*

Palm weevils: (*Temnoschoita sp. and Rhynchophorus sp.*)

They lay eggs on wound created on the palm during pruning and harvest. The larvae tunnel into the crown and trunk, a serious infestation can kill the palm. There is vascular wilt.

Control:

- â Good sanitation
- â Destruction of felled palm and stumps
- â Minimal pruning

Other pests: Rodents, porcupines, pigs, elephants, monkeys and weaver birds

DISEASES

Anthracnose:

Causal organism: Fungus

Mode of transmission: Spores deposited on leaves and stem.

Symptoms: Black or brown patches on the leaves.

Prevention and control

- â Adequate spacing in pre-nursery.
- â Use of recommended fungicides like ziram and captan.

Galadima disease:

Causal organism: *Fusarium oxysporum*

Mode of transmission: soil borne bacteria, wound created either by insects.

Symptoms: Rapid wilting of fronds, death of the entire plant.

Prevention and control:

- â Practise crop rotation, especially in the nursery.
- â Avoid infected soil.

Freckle disease: Fungus

Causal organism: *Cercospora elaeidis*

Mode of transmission: Airborne spores deposited on leaves.

â Brown spots with yellow streaks on leaves.

â Spots coalesce and tissue begins to dry out.

Prevention and control:

- â Spray with fungicides.
- â Remove infected plants.

USES

â The oil extracted from palm fruits are used in cooking food.

â Manufacture of soap, margarine and candles.

â Oil obtained from palm kernel is used in frying.

â Palm fronds are used for making brooms and roofing materials.

â Baskets can be made from the peels of fronds.

â Trunk can be split and used as supporting frames in building.

â The bunch refuse, shells and fibre can be used as fuel.

â Palm wine is obtained from oil palm tree.

Rubber

Rubber is an important crop grown mostly in the tropics. *Funtomia elastica* which is another source of latex (a white sticky fluid) was the main source of rubber before *Hevea brasiliensis* was introduced in West Africa.

Botanical name: *Hevea brasiliensis*

VARIETIES PB86, Harbel 1, FJir10

CLIMATIC AND SOIL REQUIREMENT

Temperature: 24°-25°C

Rainfall: 180-300 cm per annum

Soil requirement: Deep loamy soil rich in humus.

Land preparation: The bush is cleared, stumped, ploughed and harrowed.

Method of propagation: Seeds

Tapping: Tapping starts when the plant has a girth of 50 cm and height of 1 m from the ground. The plant at this point should be about 5-7 years. On budded trees, the first cut is made about 1.5 m from the ground and on clonal seedlings. The cut should be at an angle of 30° and cover half circumference of the tree. The cut should run from high left to low right as the tapper faces the tree. The tree is tapped every other day. Tapping instrument consists of tapping knife, a shriving of bark of not more than 2 mm thick at each tapping. The cut is made diagonally at an angle of 30°. During the cut a large number of latex vessels are ripped open and a farrier's knife is used to remove the bark, to mark the channel along which the latex flows down. A metal sport is fixed at the base of the cut to direct the latex into the collecting vessel held in position with a spring wire. An anticoagulant like a dilute solution of ammonia is put into collecting vessel to prevent the latex from coagulating. Tapping can be done year around. The tree should be allowed some rest. During tapping, care should be taken not to wound or destroy the cambium.

Processing: All the latex collected for the day tapping is poured into a rectangular aluminium-partitioned tank and diluted with water. Formic acid is poured into the tank to coagulate the latex. The coagulated latex is later cut into pieces, washed and transferred to a rolling machine, where the pieces are rolled flat and the smooth sheets are washed and treated with paranitrophenol to prevent mould growth. They are dried and put in a smoke house for 4-6 days for further drying to produce ribbed smoke-sheet (RSS rubber). They are treated with talcum powder to prevent them from sticking together and for better storage. They are sent to factories for sale and processing into mattresses, pillow, foams and carpet backings.

PESTS

Aphids: They transmit viral pathogen which causes leaf curling and distortion.

Prevention and control:

â Use resistant varieties.

â Apply appropriate insecticide.

DISEASES

Tapping panel disease:

(a) Mouldy Rot

Causal organism: Fungus (*Ceratocystis fimbriata*)

Mode of transmission: Airborne spores deposited on leaves and stem.

Symptoms:

â Growth of mould on the tapping cut.

â Destruction of cambium.

Control:

Farm sanitation

Root diseases: White root disease, brown root disease and red root disease.

Causal organisms: *Fomes spp.* and *Ganoderma spp.*

Mode of transmission: Spores are deposited on leaves and stems.

Symptoms:

â Leaves of affected plants turn bright yellow in colour and change to brown.

â If the disease is not controlled then it results in the death of the plant.

Control:

â Digging holes around the affected plant to expose the roots and scraping off the fungi.

â Drainage of soil on which the rubber is planted.

â Spray with fungicides.

USES

â Unvulcanized rubber is used for the manufacture of flexible tubings, waterproof, shoes and boots.

â Driving belts, rollers, toys, printing blanket sand other rubber products.

â Hard rubber is used for moulded goods, battery cages, various electrical fixtures,gear boxes and gears.

â Soft rubber is used for articles like tyres, insulating wires, vibration cushions rubber gloves and balloons.

Fibre or Cotton

Cotton is an example of seed fibre crop. Since the mid-1950s and the recession of dry years in the early 1970s, Nigeria is now a net importer rather than an exporter of cotton lint.

Botanical name - *Gossypium hirsutum*

Yoruba - Owu

Ibo - Owu

Hausa - Auduga

CLIMATIC AND SOIL REQUIREMENT

Temperature: 25°-35°C

Rainfall: 60 -120 cm

Soil requirement: Rich sandy loamy soil, soil pH of 5.8-8.

Land preparation: The land is cleared manually or mechanically. It is stumped, ploughed and harrowed.

Method of propagation: Seed

Planting date:

North: June/July

South: First week in July.

Seed rate: 16-22kg per hectare

Spacing: 90 cm apart

92 Å— 46 cm

90 Å— 120 cm

Sowing depth: 1.5-2 cm.

Germination: 4-6 days

CULTURAL PRACTICES

Supplying: Replace ungerminated seeds.

Thinning: Thin to 2 plants. (30-40 days)

Manuring and fertilizer application:

â Phosphatic fertilizer at final stage of land preparation.

â Muriate of potash: During planting, sulphate of ammonia after germination.

Flowering: Most commercial varieties are early maturing, and flowers 7-8 weeks after sowing.

Maturation: Boll maturation and opening occurs over a period of 4-7 months from sowing.

Weeding: Weeding should be carried out at intervals.

Harvesting: Harvesting is carried out from November to February. Cotton is ready for harvest when the boll splits open revealing tightly packed seed cotton. Cotton is harvested by handpicking of lint from the boll. The good quality lints are separated from the poor quality ones. Picking continues for upward of 2 months because boll matures at different times. Machines can be used in commercial farms.

Processing: After the grading the cotton bags are taken to the ginnery where the seeds are separated from the lint. The cotton is compressed and packed in bales. They are sold to the marketing board or industries that use them.

USES

â It is used to produce pharmaceutical cotton wool.

â The lints are turned into thread.

â Lints are used in textile industries.

â Lints are used in producing bandages and other sanitary materials.

â They are used in making bedding materials.

â The seeds are used to produce cottonseed cakes for feeding animals.

â Oil is extracted from the seeds.

â The fuzz is used in paper industries.

PESTS

Boll worm: (*Diaparopsis watersi*)

The larvae feed on buds, flower or bolls, causing either the fruiting body to fall off or causing loss in quantity and quality of lint.

Control:

â destruction of infected plants

â spraying with insecticides

â destruction of all cotton debris

Cotton Stainer: (*Dysdercus spp*)

They are sucking insects which are orange-red in colour with black markings on the wings.

They feed on the developing bolls and cotton seed. Attacked bolls may not fully open and lint may become attached to the husk. Strainers transmit a fungus which stains the lint yellow and causes weakening of the fibre.

Control:

- â Destroy infected plants.
- â Use insecticides.
- â Plant resistant varieties.

DISEASES**Bacteria blight:**

Causal organism: *Xanthomonas malvacearum*

Mode of transmission:

- â Contaminated seed coat and the cotyledons
- â By water or rainfall

Symptoms:

- â Angular leaf spot and stem
- â Branches and leaves may be killed.

Control:

- â Use of resistant varieties. Seeds should be treated before planting (Agrosan 3w)

â Destruction of all cotton plant debris

Damping off: Fungus

Causal organism: *Fusarium, Aspergillus*

Mode of transmission: Contaminated seeds or infected seedlings.

Symptoms:

- â Rolling of the stem very near to the soil.
- â Death of the plant.

Control:

- â Use resistant varieties.
- â Practise crop rotation.
- â Avoid planting on waterlogged area.

REVISION QUESTIONS**1. (a) (i) Mention four stages in the processing of cocoa**

(ii) List three cultural practices carried out in the production of cocoa

(b) Enumerate three diseases that affect the production of cowpea

(c) Discuss maize rust disease under the following headings:

- (i) Causal organism
- (ii) Mode of transmission
- (iii) Two symptoms
- (iv) Two control measures

(NECOSSCE JUNE 2010)

2. Discuss briefly the production of rubber under the following headings:

- (a) Climatic and soil requirement
- (b) Two common species
- (c) One method of propagation
- (d) Time of field planting and spacing
- (e) Fertilizer application
- (f) Maturity period
- (g) One major disease and its control
- (h) Two industrial products

(NECOSSCE JUNE 2006)

3 (a) In a tabular form, name one fungal disease, one viral and one

pest of

any four of the following crops.

- (i) Citrus
- (ii) Banana
- (iii) Tomato
- (iv) Yam
- (v) Groundnut

(b) State six general control measures of disease of crops.

(WASSCE JUNE 2002)

4. Discuss the following practices in crop production.

- (a) Transplanting
- (b) Shading
- (c) Supplying /filling-in
- (d) Nursery.

5. (a) Discuss briefly the rosette disease of groundnut under the following headings:

- (i) Causal organism
- (ii) Symptoms
- (iii) Method of transmission
- (iv) Damage done
- (v) Prevention and control

measures

(b) Assuming the spacing of a vegetable crop per stand is 30 Å— 30 cm calculate the plant population expected in a portion of land measuring 60 Å— 30 m.

(WASCESSCE JUNE 1995)

OBJECTIVE QUESTIONS

1. The botanical name of rice is

- (a) Oryza sativa.
- (b) Zea mays.
- (c) Dioscorea spp.
- (d) Manihot spp.

2. The correct sequence in preparing new land for cropping is usually

- (a) stumping, layout of farm, ridging and tilling.
- (b) laying out of farm, ridging, stumping and tilling.
- (c) tilling, stumping, ridging and farm layout.
- (d) laying out of farm, stumping, tilling and ridging.

3. Cassava and sugar cane are mainly propagated by

- (a) seeding.
- (b) layering.
- (c) budding.
- (d) cutting.

4. Parboiling is carried out in the processing of rice in order to

- (a) decrease the amount of waste product.
- (b) improve taste of rice.
- (c) facilitate the polishing of rice.
- (d) reduce percentage of breakage.

5. Which of the following plant disease is not caused by fungi?

- (a) Rice blast

- (b) Maize streak
- (c) Cassava leaf-spot
- (d) Maize rust

6. Mosaic disease affects

- (a) cotton and cocoa.
- (b) groundnut and tomato.
- (c) cassava and tobacco.
- (d) mango and orange.

7. Black pod disease of cocoa is controlled by

- (a) fumigation of soil.
- (b) farm sanitation.
- (c) application of herbicides.
- (d) application of nematicides.

8. Most viral diseases of plants are trans transmitted by

- (a) wind.
- (b) rain.
- (c) insects.
- (d) rodents

Answers to Objective Questions

- 1. (a) 2. (d) 3. (d) 4. (d)
- 5. (b) 6. (c) 7. (b) 8. (c)