4.LAND PREPARATION

- Land preparation entails all the activities that make a seed bed suitable for planting.
- A seed bed is a piece of land prepared to receive planting materials (seeds and vegetative propagation materials) which are allowed to grow until harvesting.
- It involves ploughing/ digging, harrowing, ridging and rolling.
- For the land to be suitable for planting, the physical conditions of the soil must be suitable for germination e.g. suitable soil clods, depth, looseness of soil and absence of weeds.
- The size of soil particles is called **soil tilth**
- Soil tilth can either be fine (small soil particles) or rough tilth (relatively larger soil particles).

Land reclamation.

- Refers to making useless land useful for crop production.

Conditions of land which may make land reclamation necessary.

i. Very steep land
ii. Water logging / marshy area.
iii. Forested / Bushy area.
iv. Rocky / Aridity
v. Tsetse fly infested areas.

IMPORTANCE/ REASONS FOR EARLY LAND OR SEED BED PREPARATION

1. To kill weeds.
2. To incorporate manure and other organic matter into the soil.
3. To destroy different stages of crop pests e.g. eggs, larvae, pupaae or adults by exposing them to the heat of the sun, predators and starving them.
4. To aerate the soil.

5. To encourage the penetration of roots in the soil.
6. To make subsequent operations possible e.g. planting, fertilizer application, rolling and ridging.
7. To encourage water infiltration into the soil.

OPERATIONS IN LAND PREPARATION.

- They include:

a) Land clearing.
b) Primary cultivation/ tillage.
c) Secondary tillage/ cultivation (harrowing)
d) Tertiary operations.

A. LAND CLEARING.

- Land clearing is the removal of vegetative cover from the surface before land is cultivated.

Importance of land clearing.

1. It makes subsequent operations easier and efficient e.g. cultivation.
2. It destroys pests and diseases.
3. It helps to open up a virgin land.
4. It is a method of land reclamation i.e. making useless land useful e.g. clearing helps to control tsetse flies.

CONDITIONS THAT MAKE LAND CLEARING NECESSARY

1. When opening up a virgin land.
2. Where stalk growing crop was previously planted.
3. Where land is left to fallow/without cultivation for a long time.
4. Where the interval between primary and secondary cultivation is long such that land has been reverted to the original virgin state.

METHODS OF LAND CLEARING.

1. **Tree felling-** involves cutting of down of trees using pangas, axes or power saws.
2. **Removal of stumps/ destumping-** removal of stumps which comes after tree felling.
3. **Burning-** fire is set on vegetation cover.
4. **Slashing/ mowing-** involves cutting of small bushes and grass using slasher or panga.
5. **Use of chemicals-** it is done using chemicals called herbicides.

Reasons why burning of vegetation is not recommended/ discouraged as a method of land clearing.

1. It destroys soil structure.
2. It kills useful soil organisms.
3. It destroys organic matter.
4. Fire can spread to unintended areas.
5. It can lead to volatilization of nutrients **i.e. changing of nutrients into gaseous form and escaping to the atmosphere.**
6. It can lead to soil erosion.
7. It can lead to loss of soil moisture.
8. It may lead to accumulation of nutrients to toxic levels.

Reasons why use of chemicals is not recommended / discouraged as a method of land clearing

1. Chemicals/herbicides are expensive.
2. They pollute the environment/have chemical remains.
3. Application of chemicals requires skill.

B. PRIMARY CULTIVATION.

- It refers to the initial opening of the land after bush clearing or following a previous crop.
- It is done using a hoe/ Jembe, mouldboard plough, disc plough.

Reasons/ Importance of primary cultivation.

1. To remove weeds.
2. To bury organic matter for easy decomposition.
3. To facilitate water infiltration.
4. To facilitate aeration.
5. To destroy soil-borne pests by exposing them to predators and sun.
6. To make planting easy.

Reasons for inverting soil slices during primary cultivation.

1. To bury organic matter/weeds into the soil.
2. To expose soil to agents of weathering.
3. To expose pests and diseases to predators or sun.
4. To bring up leached nutrients to the surface.
5. To encourage water infiltration.

Methods of primary cultivation/ ways of carrying out primary tillage.

i. **Hand digging-** involves use of simple hand tools e.g. Jembe, fork- jembe, mattocks to cut and turn soil slices.

ii. **Mechanical cultivation-** involves use of tractor-drawn implements e.g. mouldboard ploughs, disc ploughs and subsoilers.

iii. **Use of an ox-plough-** involves use of plough pulled/ drawn by oxen, donkey or camels.

ASPECTS CONSIDERED DURING PRIMARY CULTIVATION.

A. **TIME OF CULTIVATION-** Cultivation/ land preparation should be timely i.e. carried out before the onset of rains.

Advantages/reasons for timely cultivation.

1. To allow time for weeds and other vegetation to dry up and decompose.
2. To allow aeration i.e. carbon (IV) oxide to diffuse out and replaced with oxygen necessary for seed germination and growth of soil organisms.
3. To give enough time for other subsequent operations to allow early planting.

B. **DEPTH OF CULTIVATION-** deep cultivation/ ploughing is necessary during primary tillage.

Reasons for/ advantages of deep ploughing.

1. Facilitates aeration.
2. Facilitates drainage.
3. Breaks hard pans/facilitates water infiltration.
4. Bring up previously leached nutrients.
5. Facilitate development of deep rooted crops.
6. Expose lower soil layers to weathering.
7. Expose soil borne pests and diseases to predators.
8. Remove deeply rooted weeds.

FACTORS THAT DETERMINE THE DEPTH OF CULTIVATION.

1. **Type of crop to be planted/ grown-** Deep rooted crops require deeper cultivation.
2. **Type of implements used/ available-** well sharpened tools dig deeper.
3. **Type of soil-** simple tools e.g. jembes , fork-jembes dig shallowly on hard soils.
4. **Soil moisture content-** low soil moisture require shallow cultivation.
5. **Presence of hard pans-** deeper cultivation is necessary to break hard pans.
6. **Presence of underground obstacles/ stones/ rhizomatous weeds-** they require deeper cultivation.

C. **CHOICE OF THE CORRECT IMPLEMENTS-** correct/ right implements should be used when carrying out primary cultivation.

Factors that determine the choice of implements for primary cultivation.

1. **The condition of the land-** if land has stones/ stumps it would be necessary to use disc plough. On land with cough grass it would be advisable to use fork-jembe.
2. **Type of tilth required-** very fine tilth requires use of different types of implements.
3. **The depth of cultivation-** heavy implements are required when deep cultivation is needed.
4. **Source of power-** when heavy implements are used they require a source of power e.g. tractor, oxen etc.

C) **SECONDARY TILLAGE/ HARROWING.**

- These are operations that follow primary cultivation OR It means seedbed refinement before planting.
- It is carried out using Hoe/ Jembe, Fork-Jembe, Harrow, Disc plough, cultivators.

Factors that determine the number of secondary tillage operations (harrowings) done.

1. **Size of planting materials-** small seeds require fine tilth hence more secondary operations done.
2. **Slope of land/topography-** on a hilly land, fewer secondary operations are carried out to prevent soil erosion.
3. **Moisture content of soil-** in dry soils fewer secondary operations are carried out to conserve soil moisture.
4. **The physical condition after primary cultivation-** where there is a lot of trash, more secondary operations are carried out to incorporate most of the trash into the soil.
5. **The type of implement used-** disc plough leaves the ground rough hence many secondary tillage operations are required.
6. **Type of soil-** sand soil require fewer harrowings because it rough textured.

Reasons / importance of secondary cultivation/ harrowing.

1. To remove any weeds that might have germinated immediately after primary cultivation.
2. To break soil clods into small pieces for easy planting.
3. To level the field in order to achieve a uniform depth of planting.
4. To incorporate organic matter into the soil to encourage decomposition before planting.

D. TERTIARY OPERATIONS.

- They are extra operations that are carried out when planting of certain/specific crops e.g. sweet potatoes.
- They include:

1. Ridging
2. Rolling.
3. Leveling.

1. **RIDGING.**

- This is the process of digging soil in a continuous line and heaping it to one side to form a bund/ ridge and a furrow.
- It is done using Jembe or Ridger when growing crops like sweet potatoes, Irish potatoes, groundnuts, cassava and sugarcane.

How is it done?

- Soil is dug in a continuous line forming a furrow.
- Soil is heaped on one side forming a heap/ bund.

Importance/ Advantages/ reasons for ridging.

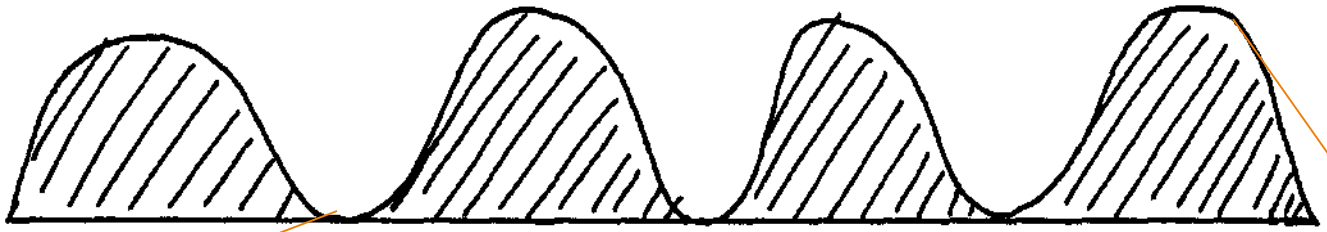
a) It encourages root development and expansion of tubers.
b) It makes harvesting of root crops easy.
c) It helps to conserve soil and water.
d) It prevents soil erosion.
e) It helps to improve soil drainage.
f) It prevents greening of tubers.

2. **ROLLING**

- It refers to compacting of soil which is loose or of fine tilth.
- It is important when planting seeds which are very thin/small e.g. finger millet, barley, wheat, simsim, pasture grass e.t.c.
- It is done by use of **rollers, firmers , simple tools e.t.c.**

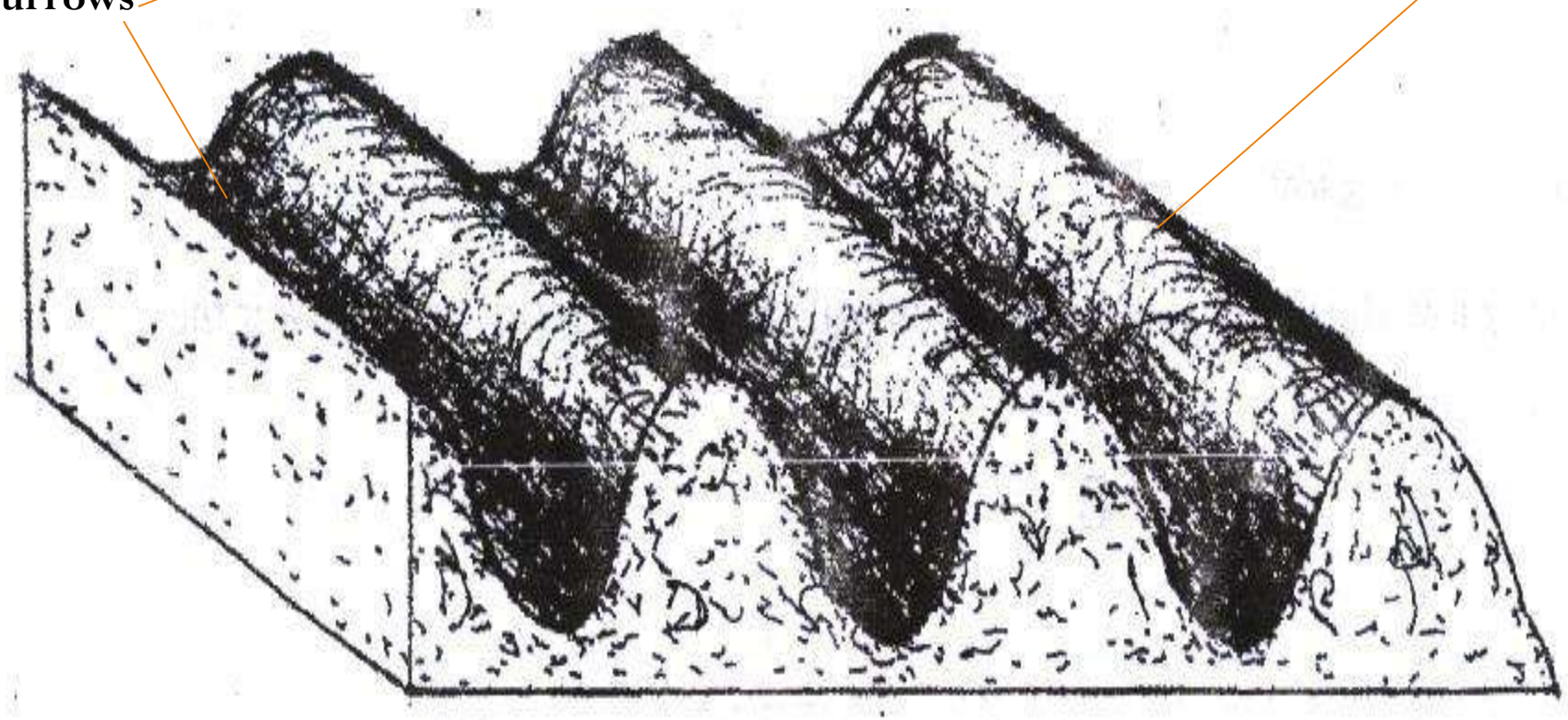
Reasons/advantages of rolling.

a) It helps to compact soil preventing wind erosion.
b) It increases seed-soil contact for easy germination.
c) It helps to crush large soil clods.



Furrows

Ridges



Sam obare

Fig. Ridging

3. **LEVELLING.**

- This is the practice of making soil surface flat and uniform.
- It is done using a **leveling board and rakes.**

Reasons for leveling.

a) It encourages uniform depth of planting.

b) It facilitates uniform germination of seeds.

c) It prevents depressions that collect too much water which lead to rotting of seeds.

SUB-SOILING.

- This is the practice of cultivating soil for the purpose of breaking the hard pans using **sub-soilers, cultivators and chisel ploughs.**
- **Soil hard pan** is a tough/hard layer formed at the sub soil.

Causes of hard pans.

i. Shallow tillage/ cultivation at the same level continuously.

ii. Continuous use of heavy machines on wet soil.

Disadvantages of hard pans.

1. Hinder root penetration.
2. Hinder water infiltration.
3. Hinder soil aeration.
4. Lead to accumulation of salts which can lead to the change of soil pH.

Importance/ reasons for sub-soiling.

1. Helps to break soil hard pans.
2. It facilitates soil aeration.
3. It facilitates water infiltration into the soil.
4. It improves drainage.
5. It helps to bring to the surface minerals that have been leached to deeper layers of soil.

MINIMUM TILLAGE.

- This refers to a combination of farming practices aimed at minimum disturbance of soil.

Farming practices carried out during minimum tillage.

1. **Use/ application of chemicals/herbicides** to kill/ control weeds.
2. **Mulching/ use of mulch-** mulch smothers weeds hence preventing their growth and seeds falling are prevented from reaching the soil where they can germinate.
3. **Cover cropping-** establishing a cover crop to control weeds by smothering them.
4. **Uprooting/ slashing/ mowing of weeds-** in perennial crops.
5. **Timing cultivation-** late weeding produces a field ready for planting a new crop without cultivation.
6. **Selective cultivation-** restricting cultivation to areas where seeds are planted. Weeds in the rest of the field are controlled by slashing.

Reasons for/advantages of minimum tillage.

1. **It helps to control soil erosion-** mulching and cover cropping reduces soil erosion.
2. **It reduces the cost of cultivation-** by reducing the number of tillage operations.
3. **It conserves soil moisture/water-** continuous cultivation exposes soil to the heat of the sun which leads to loss of moisture/ water hence it is avoided.
4. **It maintains soil structure-** continuous cultivation destroys soil structure hence it is avoided.
5. **Prevents the exposure of humus to sun's heat-** this prevents the loss of nutrients through volatilization.
6. **It prevents the disturbance of roots and underground structures-** because there are no tillage operations.

Disadvantages /limitations of minimum tillage

1. It may be difficult to control some perennial weeds.
2. It may lead to the development of hard pans.
3. It may lead to soil erosion/surface run off because soil is less porous.
4. It may lead to build up of pests and diseases.
5. Organic matter is not incorporated into the soil hence reduces the rate of decomposition.