

Study of some individual crops

Vegetables

These are crops with high moisture content whose edible part is consumed fresh or after partial cooking.

Importance of vegetables

- They are sources of income when a farmer decides to sell.
- They are very good source of vitamin like vitamin A and C.
- They act as appetizers for food e.g. onions and tomatoes.
- They are a good source of minerals e.g. Iron, magnesium.
- They help in controlling digestive problem like constipation.
- They allow efficient utilisation of labour throughout the year.
- They can be used as animal feeds like cabbages to rabbits.
- Vegetables growing provide employment for people working as attendants in vegetable gardens.
- Vegetables are a good source of manure since they rot fast.
- Leguminous vegetables fix nitrogen into the soil e.g. beans
- They can act as cover crops hence controlling soil erosion.
- They provide raw materials for some manufacturing industries like those processing tomatoes into tomato sauce.
- Some vegetables have medical value against diseases like high blood pressure, anaemia.

Challenges facing vegetable growers in East Africa

- Poor storage facilities to handle the perishable products especially in rural areas leading to rotting of produce.
- Inadequate supply of good planting materials. Some of the planting materials available have low germinability.
- Inadequate capital for purchasing tools, pesticides and quality planting seeds.

- Presence of pests and diseases that attack vegetables hence reducing their quality and quantity.
- Inadequate processing facilities for the vegetables. This makes farmers to sale poor quality and highly perishable unprocessed products.
- Limited skills and knowledge possessed by the farmers in vegetable management.
- Unclear marketing systems for the vegetables especially those in rural areas.
- Declining soil fertility levels due to continuous cropping has made the use of fertilisers expensive to vegetable farmers.
- Climate change that has brought about long dry spells and heavy storms that make vegetable management challenging and destroys vegetable gardens.
- Poor roads and unavailability of transport means to appropriately transport the products from rural areas to towns where they are demanded.

Classification of vegetables

Vegetables can be classified into two ways: according to the part eaten and according to family.

1. According to part eaten

- **Leafy vegetables;** Cabbages, Amaranthus, Spinach.
- **Fruit vegetable;** Eggplant, Tomatoes, Water melon, Cucumber, Pumpkin, Okra.
- **Seed vegetables;** Cowpeas, G-nuts, Beans, Garden pea, Field pea.
- **Root vegetables,** Onions, Sugar beet, Garlic, Carrots, Irish potato.
- **Flower vegetables:** Cauliflower, Turnip, Radish.

2. Family classification

- **Leguminosae (pulse);** these include; Beans, Pigeon pea, G-nuts, Garden peas, Cowpeas.
- **Solanaceae (Tomato family);** These include: Irish potatoes, Eggplants, tomatoes, Sweet pepper.

- **Brassicaceae (cabbage family);** It includes; Cabbage, Cauliflower, Radish, Turnip, Kale.
- **Cucurbitae (gourd family);** Includes ; Pumpkins, Water melon, Cucumber, Gourds.
- **Alliaceae.** This includes; Onions, Leek, Garlic.
- **Apiaceae.** Include; Carrots.
- **Amaranthaceae;** e.g. *Amaranthushybridus*, *A. dubius*, *A. caudatus*.

Procedure Followed in Growing Vegetables

1. Choosing the site.

Factors considered when choosing a site for vegetable growing

- **Fertility of the soil:** The soil should be deep and fertile. In case at low fertility fertilizers should be applied.
- **Availability of water,** the site should have enough water supply hence the site should be close to a water source.
- **Distance from home.** The site shouldn't be far from home for security reasons and easy management.
- **Freedom from frost:** The area should be free from frost and the farmer to effect this should avoid valley bottom.
- **Freedom from shade:** The place shouldn't be having shade since some vegetable like tomato and eggplant do not thrive well in shade.
- **Topography:** Gentle slope or flat land and require for fair drainage.
- **Wind protection:** the place should be protected from strong winds.

2. Preparing a nursery bed.

Definition of nursery bed

A nursery bed is an area measuring 1-meter-wide by any length where seedlings are grown before they are transferred to the actual vegetable field / garden. The seeds can be planted in a seed bed, seed boxes or soil blocks.

A seed bed on the other hand is a piece of land which has been prepared and is ready to receive the planting materials where they can grow up.

Types of nursery beds

- **Sunken nurseries** are prepared during the dry season.
- **Raised nurseries** during rainy season.
- **Seeds boxes** Seed boxes are wooden boxes filled with fertile soils in which seedlings are raised.
- **Soil blocks** are polythene sleeves filled with fertile soils to raise seedlings.

Benefits of raising seedlings in a nursery bed

- Many seedlings can be prepared in a small area.
- Makes it easy to carryout routine management practices.
- Provides the best conditions for growth i.e. fine tilth.
- Small seeds can be planted to develop into strong seedlings that are easy to plant.
- Ensures transplanting of healthy and vigorous seedlings.
- Excess seedlings may also provide a source of income for the farmer when sold.
- It is used in selecting healthy and strong seedlings.
- Provides conditions for raising cuttings of crops that need special treatment e.g. tea.
- It reduces time period of growing the seeds so marketing happens earlier at higher prices.

Factors to consider when selecting a site for a nursery bed

- **Water source:** Nearness to water sources makes watering easy.
- **Type of soil:** the soil should be deep, fertile and well drained.
- **Topography:** Gentle slopes are preferred to avoid erosion and flooding.
- **Security:** the site should be well protected from wild animals, birds and thieves.

- **Sheltering / shelter:** the site should be sheltered well with wind brakes in order to prevent the strong wind from causing damages to the seedling.
- **Previous cropping:** A nursery bed should not be made in a site where the previous crop grown belonged to the same family.

Procedure of making a nursery bed

(a) Tree nurseries

- Vegetation is cleared and trash removed.
- Digging is done to remove perennial weeds.
- Size of the nursery bed should be 1m wide by any length leaving paths 60cm wide between individual beds.
- Add phosphatic fertilizers to organic manures.
- The ground is leveled using a rake.
- Trees are established in polythene sleeves.
- Pre – germinating seeds that have been put in water for 24 – 48 hours are used.
- Plant the seeds in polythene sleeves half – filled with soil and phosphatic fertilizers.
- Fill the sleeves to $\frac{3}{4}$ with soil. This makes transplanting easy.

(b) Vegetable nurseries

- Remove all grasses, roots and tree stumps on the area.
- The place should be cultivated deeply to encourage proper root development.
- All large soil pieces should be broken down to encourage a fine bed.
- Incorporate manure containing phosphorous into the soil to improve fertility
- Leave the area to settle for Atleast 3 – 4 weeks before planting seeds
- Measure off the nursery bed to a width of 1 metre and any length that you feel.
- Rake the soil to remove stones, trash and create a fine tilth.
- Erect a shade on the prepared place to control light and water delivered to the seedlings.

- Make ridges across the bed where the seeds are to be planted and firm the soil to reduce chances of being eroded.
- Place the seeds in the ridges and cover it with a thin layer of soil and mulch to facilitate germination.

Management of seedlings in a nursery bed from planting to transplanting

- Place a thin layer of mulch over the seeds to conserve soil moisture and control weeds.
- The seeds should be watered twice each day in the morning and evening.
- As soon as the seeds germinate the mulch should be removed since it may interfere with germination.
- After germination excess seedlings can be removed a practice called pricking out.
- Apply fertilizers to the seedlings to improve growth.
- Apply pesticides to control pests on the seedlings
- Spray fungicides on the seedlings to control fungal infections like damping off.
- Provide a good shade over the nursery bed to control damage to seedling due to harsh environmental conditions.
- At a later stage before transplanting seedlings are exposed to environmental conditions referred to as **hardening off**
- Remove diseased and excess seedlings from the nursery bed i.e prick out to reduce disease spread and allow proper seedling growth.
- Weed the bed to reduce competition for nutrients and control disease spread.
- Transplanting should be done in the evening hour or morning to reduce the rate of water loss from the seedlings by transpiration. Seedlings must be watered atleast twice a day i.e. in the morning and evening.

3. Preparation of a seed bed

A seed bed is a well prepared piece of land ready to receive planting materials.

- The land should be cleared of large bush, all trees and grasses
- All tree roots and stump should be removed in advance.
- The whole place should be deeply cultivated and big pieces of soil broken.
- The whole place should be measured to establish the size in accordance to the number of seedlings to be planted.
- The place should be leveled before planting seedlings.
- The whole vegetable garden should be along the contour of land to reduce erosion.

4. Transplanting

This is the transfer of seedlings from the nursery bed to the main field (seedbed). Precautions to be taken when transplanting seedlings

- Seedlings in the nursery bed should be well watered before lifting to reduce root breaking.
- Seedlings should be lifted with soil on their roots to control distorting of roots.
- Care should be taken not to damage roots as it may deter proper crop establishment and development.
- Transplanting holes should be big enough to accommodate seedlings without bending roots since it may affect root development.
- Where fertilizers are used it should be thoroughly mixed with soil for efficient utilization by the seedlings.
 - Seedlings should not be planted deeper than they were in the nursery for proper establishment.
 - Top soil and sub soil should not be mixed but filled to holes separately.
 - Transplant at the beginning of rain for easy crop establishment.
 - Provide temporary shade to the transplanted plant (seedlings).

- Mulch around the seedling.
- Continue watering until the plant has fully established itself.
- Transplanting should be done during the cool hours to reduce wilting of seedlings through excessive loss of water by transpiration.
- Seedlings should be watered after transplanting if the soil in the field is dry to provide adequate moisture for crop establishment and growth.

Transplanting the seedlings

- Only healthy, strong seedlings should be selected.
- Watering of the nursery to soften the soil to ease transplanting and reduce root damage.
- Transplanting should be done in the evening or in cool weather.
- Thorough preparation of the seedbed by removing all tree stumps and roots remove any other vegetation Atleast two months before transplanting.
- Dig holes before transplanting at the required spacing
- Fill the holes with a mixed top soil and double supper phosphate or organic manure Atleast 2 -3 weeks before planting.

Managing vegetables in the seedbed after transplanting

- **Application of fertilizers.**Vegetables require more of N, P and K which should be applied early for vigorous plant growth.
- **Gapping;** the replanting of fresh seedlings in holes where seedlings failed to grow after transplanting. This is done to enable efficient utilisation of soil nutrients and attain a conducive plant population in the field.
- **Weeding ;**Effective weed control is needed to ensure proper growth of the vegetable since they are more sensitive to competition.

- **Disease and pest control.**Vegetables are attacked by a number of fungal and bacterial diseases like dumping off, downy mildew, bacterial wilt, mosaic, dry rot, black rot, stem rot, and blight. The common pests are cut worms, termites, grasshoppers, caterpillars, mole crickets, aphids, thrips, nematodes and beetles.
- **Staking;** the practice of providing support to growing vegetables using poles or wires.
- **Harvesting;** Most vegetables are early maturing and are normally harvested manually after harvesting they should be kept in a cool place to that they don't go bad.

Growing of tomato seedlings from nursery bed preparation to transplanting

- Select a good site for vegetable production
- Remove all vegetation from the area where to prepare the seed nursery bed.
- Cultivate deeply removing all roots from the bed.
- Raise a the soil level in case the soil is poorly drained.
- Incorporate well rotten F.Y.M / compost or S.S.P fertilizer.
- Level the soil by raking and remove any foreign material like stone, polyethene or glasses and break any big clods of soil.
- Put support side logs e.g. banana stems to protect the bed from getting washed away.
- Sow the seed at 0.5cm deep and cover lightly with soil
- Spacing should be 15cm between the rows.
- Mulch the bed lightly and remove after seeds have germinated
- Erect a shade over a nursery bed to protect seedlings from harsh environmental conditions.
- Water from the top of the shade twice a day, morning and evening using a watering can.
- When the seedlings grow up to about 2.5cm high, prick out to ensure proper spacing and growth.

- Weeding should be carried out with a garden trowel or suitable tool
- Spraying seedlings with copper fungicides such as ridomil and diethane M45 to control late blight and other pests should be done.
- As seedlings near 15cm in height, reduce the shade to ensure hardening off.
- A week before transplanting water the seedling to ensure the soil is soft to avoid breaking roots.
- A week before transplanting, remove all the shade to ensure full hardening off.
- Transplanting should be done in the evening or cloud cast day to reduce water loss from the seedlings.
- At transplanting use a trowel to remove seedling with soil around the roots.
- At transplanting use a trowel to remove seedling with soil around the roots.
- Water immediately after transplanting.

Varieties of tomatoes

- Money maker, ROMA V.F, Marglobe, Heinz, Sam Marzano, Kenton F1 hybrid, Romanova.

Diseases of tomato

Tomato Blight-It's a fungal disease, it attacks leaves, stems and fruits causing brown – black sunken lesions

It's very severe in humid weather.

It can be controlled by spraying with copper fungicides such as ridomil and diethane M45.

Bacterial Wilt

It is caused by *Pseudomonas solanacearum*, it causes wilting and death of growing point and upper leaves.

Its airborne and controlling its spread is difficult. However the following control measures are recommended:-

- Remove and burn all infected plants.
- Crop rotation
- Use resistant varieties
- Sterilize the soil by burning grass on top or apply formalin or boil

- By following

Tomato Mosaic

This is a viral disease, which causes curling and molting of leaves thus reducing the area of photosynthesis.

It may be transmitted from tobacco shred or a smoker's hand.

It is controlled by

- planting resistant healthy seeds
- burning all affected plants and planting healthy seeds
- Smokers should wash their hands before touching tomato plants.

Pruning tomato

- One or two stems are left per plant.
- Remove lateral shoot **weekly**
- When 6 – 8 trusses of flowers pinch out the growing it this pruning will encourage the growth of good size marketable tomato.
- Remove leaves close to the ground to prevent the entry of blight.

Importance of pruning tomatoes

- Improves the quality of fruits by exposing each to enough light.
- Improve yields by ensuring big fruits due a reduced competition for nutrients between various branches.
- Makes spraying against disease more easy.
- Removes a micro climate that can encourage pests.
- Harvesting becomes easier since fruits are properly exposed.
- Makes movement within the garden simpler.

Staking tomatoes

There are several methods of staking tomato the common method includes:-

- Single staking.
- Cross staking using a wire cross poles.

Importance of staking tomatoes

- Controls fungal diseases that can attack tomato fruits especially soil borne diseases.
- Improves the quality of fruits by preventing contact between soil and fruits.
- Prevents pest attack of tomatoes by crawling pests.

- Exposes fruits to adequate air and light which improves quality.
- Reduces wastage of pesticides by exposing fruits for easy spraying.
- Make movement within the garden easy.

EXERCISE

1. Individually,
 - a) Draw a budget for purchasing seeds (a small sacked of tomatoes or Corrads -SUKUMA) and a sack.(not more than 30,000UGX).
 - b) Identify the garden tools you will need for growing vegetables in a sack.
 - c) Fill the sack with loam soil mixed with a basin of sand soil.
 - d) Place the sack in a horizontal position and create holes on the sack (about 25 holes).
2. If you are using tomatoes, plant the seeds in a nursery bed and keep managing them for 2 weeks, if you are using collards (sukuma), plant the seeds straight in the holes created on the sack and water them.
3. Keep carrying out agronomic practices on the seedlings or seeds.
4. Share pictures of each stage of your activities on the school watsApp or facebook page or the teacher's WatsApp number (0773012466).
5. Write a report about the whole process and send it to the teacher's watAspp number.
6. Remember to train some one to manage the vegetables even in your absence.

Thank you