Unit 2

Fruit Crops Production and Management

- Fruit crop is a perennial, edible plant cultivated for its true botanical fruit or products derived there from.

Importance of Fruit crop production in Ethiopia

- Fruits contain nutrients, minerals, vitamins and are inexpensive source of energy.
- Their production improves the household food security and income.
- When exported, they are a good source of foreign currency.

- Fruit production can contribute to the food and nutritional security.
- It is automatically profitable and good for the environment.
  - It enhances natural resource conservation & maintenance.
- It is vital in diversifying the national economy.
  - It is the basis for establishing agro processing industries that can reduce unemployment.
- Major fruit crops produced in Ethiopia are pineapples, passion fruits, bananas, avocados, mangoes, citrus fruits, mandarin, papaya, guava and grapes.

Problems of Fruit crops production in Ethiopia

- Commercial fruit production was introduced to Ethiopia in the late 1960s and the early 1970s.
  - It is relatively new to Ethiopian agricultural system.
- There is an acute shortage of fruits in the Ethiopian highlands due to very low production.
- Technical knowledge in proper production, management and storage is lacking among most small scale producers.

Prospects of fruit crop production in Ethiopia

- Fruit consumption has increased recently because of the recognition of their nutritional benefits.
- There are conditions that can enhance fruit production in Ethiopia.
  - Ethiopia has diverse agro-ecologies, enough water resources & cheap labor.
  - Ethiopia is located close to the Middle East and European markets.
  - Attractive policies have beend introduced and implemented.
- Fruit production can improve the livelihood of fruit-producing communities.

Classification of fruit crops

1. Classification based on structure

a) Simple Fruits

- They develop from a single mature ovary in a single flower.
- Apple, grape and citrus fruits are examples.

i. Fleshy Fruits: pericarp fleshy at maturity. e.g. grapes, bananas

ii. Dry Fruits: pericarp dry at maturity. e.g. coconut, peanut

iii. Dehiscent fruits: split open when fully mature. e.g. Silique

iv. Indehiscent fruits: do not split open and do not release seeds at maturity. e.g. Pome, sunflowers

b) Aggregate Fruits

- They consist of a number of mature ovaries formed in a single flower and arranged over the surface of a single receptacle.
  - The individual ovaries are called fruitlets.
- Strawberry is an example.

c) Multiple Fruits

- They consist of the mature ovaries of several flowers fairly united into a mass.
- Pineapple is an example

2. Classification based on temperature requirement

a) Tropical fruits

- They grow in a year-round summer-like growing season without freezing temperatures.
- Banana, pineapple, papaya, mango and guava are examples.

b) Sub-tropical fruits

- They cannot tolerate severe winter temperatures; they need some winter chilling.
- Citrus, figs, and olives are examples

c) Temperate fruits

- They require a cold winter season as well as a summer growing season.
- They can survive temperatures considerably below a freezing point.
- Apples, cherries and peaches are examples.

3. Classification based on ripening/ response to ethylene

a) Climacteric fruits

- They are characterized by a ripening-associated increase in respiration and in ethylene production.

- The ethylene is the major trigger & coordinator of the ripening process.
- Tomato, apple, pear, and melon are examples.

b) Non-climacteric fruits

- They are characterized by the lack of ethylene associated respiratory peak and the signaling pathways that drive the ripening process.
- Grape, orange and pineapple are examples.

4. Classification based on plant characteristics

a) Tree fruits

- They are fruits produced on trees like peach, plum, mango, citrus, avocado, guava, mango, coffee, apple, etc.

b) Small fruits

- They are fruits produced on shrubs like blackberry, raspberry, blueberries, etc.

Principles and techniques of fruit propagation

A. Sexual plant propagation (Seed propagation)

- It is developing plant from seed.
- Seeds germinate and begin active growth when exposed to a favorable environment.
  - ➢ Pre-sowing treatments are applied to overcome seed dormancy.
    - ✓ Seed dormancy is a period during which seed is not growing.
  - ➢ The most common pre-sowing treatment methods are soaking in hot/cold water, fire or heating methods, soaking in chemical or alternate wetting and drying.
- Fresh, viable and quality seeds must be used.

Advantages of Sexual Plant Propagation

- It is the easiest and least expensive method.
- Seedling trees are hardier and have longer life span
- It allows propagation of plants which are difficult to propagate by vegetative method e.g. papaya, phalsa, coconut, etc.
- The rootstocks for budding and grafting are obtained by means of sexual propagation
- Sexually propagated plants can be more resistant to pests and disease
- Poly-embryonic varieties can be propagated by seed.

Disadvantages of Sexual Plant Propagation

- Seedlings take more time to bear fruits (late bearing)
- Quality of existing plants cannot be improved by sexual propagation
- Plants propagated sexually are large. This raises the cost of fertilization, pruning and spraying chemical.
- There is no guarantee about genetic purity of plant
- Identification of sex in seedling is not possible

B. Asexual Plant Propagation

- It is the use of vegetative parts or fragments of plants such as leaves, stems, and roots for plant propagation.
  - The material used for asexual propagation is obtained from a plant in the adult phase.
- Asexually propagated trees are exact copies of their mother plants and bear the same type of fruit.
  - They will not have a juvenile phase unlike a plant from seed.
- Cuttings, air layering, grafting, budding and micro propagation are the most common methods.

Cuttings

- Part of a stem, root, or leaf is cut from the parent plant, placed under certain favorable environmental conditions and induced to form roots and shoots.
  - The stem cutting is one of the most important plant propagation types in fruit propagation.

Advantages of cuttings

- Certain plants and trees are better propagated via cuttings.
- Propagating from cuttings is inexpensive and easy
- Cuttings provide us with a replication of the fruits we get from the parent tree.

Air layering

- A portion of plant is forced to produce adventitious roots without detaching it from the parent plant.
  - Adventitious root develops from a non-root tissue.
- It is usually used in plant species that are difficult to root.

Steps of air layering

1) well developed parent plant is selected,
2) one shoot is bent to the soil,
3) the bending shoot starts to root
4) the bending shoot becomes an independent plant

Grafting

- Grafting is the joining of parts of plants together in such a way that they unite and continue to grow as a single plant.
  - The part of the plant that becomes the upper portion of the new plant is called the **scion**.
  - The part which becomes the lower portion is called the **stock** or **root stock**.
- Grafting should involve only closely related species or plant families.
- Cleft or wedge grafting is the most common type of grafting as it has a good chance of success.

Establishing a nursery

- A nursery is a managed site where plants are cared for during their early growth stages.
- A nursery provides young plants with suitable conditions for germination and subsequent growth.
- Successful fruit production involves proper selection of site, planting distance, proper selection of plants and their varieties.

Site selection for nursery

1. The topography of the area should be gently slope
2. There should be a continuous and sufficient supply of water

3. The site should not be exposed to strong winds or protected with well-established windbreak
4. It should be well drained and have fertile soil
5. The area should be separated from production field but must be located near main field
6. There should be an adequate, dependable labor supply.
7. The area to be selected should be free from flooding
8. It should not be close to shade of trees or buildings

Seedlings

- Seedlings could be raised in nursery beds or in polythene bags.
- Raising seedlings in polythene bags often gives better seedlings.
  - The tap root system is often not disturbed.
  - It saves labor for weeding and watering.
- Many problems in fruit production can be avoided by taking good care at the nursery stage of fruit development.
  - Get the right planting material
  - Discard seedlings with twisted or poorly developed roots or stems

Management of Orchards

- Orchard is land allocated exclusively for fruit production.
- One of the most important considerations in the establishment of an orchard is the availability of resources.
- Site selection is the most important decision that determines the success of fruit production.
  - Production site affects yield quality and marketability.
  - Good fruit production sites provide maximum fruit trees/ha.
- Land preparation, preparing holes and planting of the fruits are important practices.

Planting and planting distance

- Planting distance (spacing) is mainly determined by the type of fruit crop to be grown and environmental factors.
  - For fruit trees of wide canopies, a wide spacing is needed.
  - Sexually propagated plants (large size) need wide spacing
  - Soil quality and rainfall patterns can determine spacing

Irrigation

- It is the practice of applying controlled amount of water to land to help grow crops, landscape plants and lawns.
- Consider the quality of irrigation water in terms of salt content, the amount of irrigation water and the irrigation time.

- Irrigation methods used can be either surface irrigation or pressurized (power driven) systems.

1. Surface or gravity irrigation

- Water is applied directly to the surface.
- Flood irrigation, furrow irrigation are examples.

Advantages

- It is easy to maintain
- It requires low cost
- It does not need any modern technology
- It works effectively in a low filtration rate
- Technical skill is not required

Disadvantages

- Level lands require high accuracy
- Not applicable on soil with a high filtration rate.
- Plants are always covered with water
- Sometimes limited space gets more water than required.
- No drainage outlet.

2. Pressurized irrigation methods

- Water is pressurized and precisely applied to the plants under pressure through a system of pipes.
- They are more effective in application of water to the crops.
- It can be done through a sprinkler or through drip irrigation.

a) Sprinkler irrigation system

- Irrigation water is sprayed to the air and allowed to fall to the ground as rain/ mist.

Advantages

- Suitable for soil with high infiltration rate
- Fertigation is possible
- Practiced in not-levelled field surface

Disadvantage

- Costly to install and to maintain
- Wind drift of water droplets
- Require continuous power supply
- Adequate quantity of water.

b) Drip Irrigation System

- Water is applied through network of pipelines and allowed to fall drop by drop at crop root zone.

Advantages

- Save water
- Facilitates easy infiltration
- Maintain moisture at root zone
- Fertigation is possible

Disadvantages

- High maintenance cost
- Not economical for closely spaced crops

Factors Influencing the Quality of Fruits during Harvest and Post-harvest

Stage and time of Harvest

- Make sure that the fruit crop is at the right stage of harvest.
  - Pick or harvest them when they are nearly ripe.

Postharvest handling of fruit crops

- Postharvest considerations for fruits are: pre-cooling, sorting and grading, packaging and packaging materials, storage, temperature and relative humidity during storage and transportation, and transportation.

Floriculture and Landscaping

- Floriculture deals with the cultivation of flowering plants, decorative foliage plants, cacti, orchids, succulents, bonsai, ferns, plants grown in containers as well as landscape gardening.
- Floriculture is referred as Ornamental Horticulture.
  - Ornamental plants are plants with parts that are decorative, showy, attractive, and used for both aesthetic and functional purposes.

Floriculture in Ethiopia

- Ornamental Horticulture started in Ethiopia recently but it is increasing.
- Ornamental plants are one of the top export commodities of Ethiopia.

Opportunities for expansion of Floriculture in Ethiopia

- Suitable climate
- Enough resources
- Proximity to Middle East and European markets
- Increasing domestic market
- Government policy and investment incentives

Importance of Floriculture in Ethiopia

- Earns foreign currency
- Product diversification
- Job opportunity for the people
- Encourages supportive industries
- Promote investment

Important flower crops grown & exported from Ethiopia

- Roses, Poinsettia, Geranium/Pelargonium, Chrysanthemum, Lilies, Carnation, Gypsophila Statice, Hypericum , and Freesia

