Practical 1

EXERCISE 1.1:
VISIT TO ORNAMENTAL GARDENS

Objective :

- To get acquaint with different styles and types of gardens developed
- To get knowledge about different types of ornamental plants used in different gardens.

Delivery schedule : 01 period

Student's expectations/ Learning objectives:

- To study different styles of gardening
- To acquire knowledge of ornamental plants for use in different gardens
- To get knowledge of developing different features in garden

Pre-learning required: Knowledge about different types of gardens and ornamental plants.

Handouts/material required/equipment's & tools: Paper sheet and pen to note down the instructions, transport facility for visiting different gardens.

Introduction:

Several ornamental gardens have been developed in different parts of the country in cities and other places of historical importance during various regimes. Historical gardens developed had set different styles of gardening. These gardens have been influenced by the environmental factors, topography, vegetation, construction material, people, their customs and the purposes of using these gardens. Primarily these gardens are grouped into two styles as Formal and Informal gardens. The key features of such gardens are given below:

Formal gardens:

- First plan is made on paper and then land is selected accordingly
- Land is leveled
- Symmetrical design
- Geometrical: Square, rectangular, circular beds and borders

- Roads and paths cur at right angle
- Balance is symmetrical as same feature replicated on both sides of central axis
- Hedges, edges and topiary are trimmed
- Trees can be selected as individual feature
- Mughal, Persian, Italian, French, Chinese and American gardens
- The famous Mughal gardens developed in India are in Kashmir (Nasim bagh, Nishat garden, Shalimar garden, Chasma-e- Shahi, Achabal, Bijbehara, Verinag, etc.); Mughal garden Pinjore, Mughal garden at Rashtrapati Bhavan, New Delhi.

Informal gardens:

- Plan is forced to fit the land
- Main aim is to capture natural scenery
- Land is not leveled
- Asymmetrical design
- Non-geometrical beds and borders

- Untrimmed hedges, edges and topiary
- Individual plants are not selected as feature
- Japanese, Chinese, English gardens
- Informal gardens developed in India are at Brindavan, Mysore; Budhajayanti Park, New Delhi and Roshnara Park, New Delhi.

To get acquainted with the prevailing commercial floriculture activities in the state in general and region in particular, the important flower nurseries, commercial production units in government sector, progressive flower growers and florist wholesale and retail shops will be visited. The students will be exposed to the practical capsules for getting maximum quality and problems associated in commercial floriculture. The detailed information with reference to important cut flowers, pot plants, cut greens, planting material and seed production of ornamentals being grown will be given.

Procedure:

i) Students will be taken to the nearby or important gardens of the region/ state/ country for making them familiar with different styles and types of gardens.

ii) Important flowers and ornamental plants in the garden will be identified and their use in gardening will be explained.

iii) The use of infrastructure in gardens will be explained.

iv) Any insect-pests or diseases infesting flower crops and ornamental plants will be identified and their remedy will be suggested at the spot to the students and growers.

v) Development of different features in the garden will be explained on the spot.

Precautions:

i) Maintain the proper discipline during the visit.

ii) Don't argue on unnecessary point with the officers/ officials of the gardens.

iii) Avoid confrontation on any issue with your classmates, the gardeners, tourists visiting the garden.

Exercise: Prepare diary of all events of the tour. Take photographs of important garden features and paste on the tour report to be submitted.

EXERCISE 1.2: VISIT TO AN ORCHARD

Objective :

- Acquaintance with features of an orchard and different aspects of orchard establishment.

Delivery schedule : 01 period

Student's expectations/ Learning objectives:

- Studying the features of an orchard
- To know about different fruit crops grown in an orchard
- Points to be remembered while establishing an orchard.

Pre-learning required: Knowledge about establishment of an orchard

Handouts/material required/equipment's & tools: Paper sheet and pen to note down the instructions and pictures of different fruit plants.

Introduction:

Indian topography and agro climates are well suited for horticultural crops, which are considered ideal for achieving sustainability of smallholdings, increasing

employment, improving environment, providing an enormous export potential and above all achieving nutritional security. Furthermore, horticulture has the potential for improvement of wastelands as well as arid and semi-arid areas. Most of the horticultural crops need comparatively less water compared to field crops and provide higher employment opportunities, better nutritional security as well as healthy environment. Fruit production is profitable. Farmers involved in fruit production usually earn much higher income as compared to cereal producers. Cultivation of fruits allows for productive employment where the labour/ land ratio is high, since fruit production is usually labour intensive. Increasing fruit production contributes to commercialization of the rural economy and creates many off-farm jobs. It also provides ample opportunities for sustaining large number of agro-industries, which generate substantial employment opportunities. It is indeed important for students to know about different fruit crops, their nomenclature, at what time we plant them, how do we plant them, what are their important insect- pests and diseases and their management, what are the edible parts of different fruits and how do we harvest and market them.

Features of an ideal orchard

Orchard is a piece of land cultivated with fruit crops and related horticultural crops.

1. Store and office building: It should be in the centre of the orchard for easy and proper supervision of work by the manager. For easy approach of labours to take any implements and tools needed for their work, to take the inputs like herbicides, weedicides, pesticides, fungicides, fertilizers etc., to the field. In the store room, racks should be provided to keep the herbicide or weedicide, pesticide and fungicide. Wooden plank (flat piece of timber) is arranged on the floor to keep fertilizer bags. The garden implements and tools are arranged in the racks. Storage bins are also kept in stores for storing the seeds and produces.

In the office, racks are used to keep records and registers related to orchard management such as stock register, produce register, muster roll, attendance register, tree register etc.

2. Wells and water tanks: It should be located at convenient places in different parts of the orchard atleast one well for 2 to 4 hectares. Water tanks are used to store water. From the well the water is lifted and stored in the tank and used for irrigation. Wells and water tanks are connected with irrigation channels of concrete nature or pipes. From the tank, irrigation channels are used to take water to the field.

3. Separate blocks: For each fruit crop, a separate block should be allotted. Fruits ripening at the same time should be grouped together. In deciduous fruit trees (sheds leaves during winter such as apple, pear, plum, peach), there are certain varieties which need pollen from another variety to set fruits. The trees which provide pollen are called pollinizers. For example in apple, Golden Delicious, Tydeman Early Worcestor, Lord Lambourne and Granny Smith are pollinizers. Every third tree in third row should be planted with a pollinizer or every fourth tree in every fourth row should be planted with pollinizer.

4. Irrigation channels: Two types of channels viz., concrete and mud channels are laid out in the orchard. Concrete channel reduces water loss through seepage and maintenance is easy as compared to mud channel. Weed growth is very less or negligible in concrete channel. Channel should be laid along the gradients for most economical conduct of water. For every 30 m length of channel, 7.5 cm slope should be given.

5. Roads and foot paths: These two components should occupy minimum space for the economy of transport. The metal road in the main areas are advantageous because it is easier for the movement of vehicles like tractor or lorry to carry fertilizers, pesticides and harvested produces, planting materials like seedlings, layers, grafts, cuttings, etc. In the centre of road the height should be more than at the sides. There should be a gentle slope from the centre towards the edge of the road, so that there won't be any stagnation of water during rainy season.

6. Fruit trees: Short growing fruit trees should be planted at the front and tall at the back for easy watch and to improve the appearance of the orchard. Short growing fruit trees are guava, pomegranate, annona and aonla. Tall growing fruit trees are avocado, mango, sapota and litchi.

Evergreen trees such as papaya, sapota, mango and oranges should be in the front area and deciduous ones like apple, pear, peach, plum, apricot and almond behind the evergreen trees. Fruits attracting birds and animals should be close to the watchman shed, so that watchman can protect them to the extent possible.

7. Manure pit: Manure pit is essential to dump the waste plant materials after the harvest of the produce. This will enable to supply considerable quantity of organic manure to the farm. This should be located in a corner of the orchard.

8. Fencing: It may be live fence or artificial ones. Live fence is economical and cheaper compared to other. Suitable plants for fencing are *Agave, Prosopis juliflora, Pithecolobium dulce etc*. These crops are planted closely in 3 rows which serve as good fence. In artificial fencing, stones or concrete pillars are planted at regular spacing (4 or 5 feet) and they are connected by barbed wire. Trees used for fencing should be drought resistant, easy to propagate from seed, quick growing, have dense foliage, should withstand severe pruning and should be thorny.

9. Wind breaks: These are rows of tall trees planted close together around the orchard. These are essential to resist wind velocity which cause severe loss particularly moisture loss from the soil through evaporation and fruit drop. Wind breaks are efficient in reducing the velocity of wind thereby minimize the damage to the fruit crops by wind. Wind breaks are planted in area where there is heavy wind. Its effectiveness is maximum for a distance of about 4 times as great as its height but has some effect over twice about that distance. For effective control, wind break should be planted in double rows and the trees are alternately placed. Wind break should be of tall growing nature. The spacing between wind break and first row of fruit tree should be similar to that of the space between fruit trees. It is advantageous to dig a trench of 90 cm deep at a distance of 3 m from the wind break trees and prune and cut the roots of wind break exposed and again fill up the trenches. This has to be repeated for every 3 or 4 years in order to avoid the competition between wind break and fruit trees for moisture and nutrition. Some specific characters of wind break are erect nature, tall and quick growing, hardy and drought resistant, mechanically strong framework and dense nature to offer maximum resistance to wind. Some of the common windbreaks are *Casuarina equisetifolia, Polyalthia longifolia, Eucalyptus globules, Grevillea robusta* and *Azadirachta indica* etc.

10. Layout of an orchard: Arrangement of plants in a particular system of planting depending upon its vigour, growth habit and spacing requirement is known as layout. While laying out an orchard, the factors to be considered are system of planting, tree vigour, spacing, water requirement, cultural operations like training/pruning etc. Proper layout of the orchard would facilitate easy supervision, management and planning for future expansion. Cultivation of perennial and annual crops of fruits, vegetables and to some extent flowers should also be taken into account while making layout.

Points to be remembered while establishing an orchard

- The orchard should be established in such a location where the soil, climate and other physical facilities required for successful growing of crops and marketing of the produce are available.
- The selected site, if uncultivated, should be cleaned by uprooting the existing trees and bushes and leveled properly after deep tillage. If the land or site is in a hill area, the prepared land should be divided into terraces depending upon the topography of the land and then leveled within the terraces.
- The leveled land should be divided proportionately for growing crops and for roads, paths, building etc. Minimum / optimum space should be allotted for each feature. Roads & Paths should occupy only 10% of the total area, provided with convenience, economy in transport and supervision. The farm office should be located at the center of an orchard, which should be easily approachable by road.
- Drainage and irrigation channels should be kept concealed as much as possible which could save water from seepage and evaporation. Irrigation channels should be well spaced so that it could cover all the plots.
- While planting the fruit trees, evergreen fruits should be planted in the front and deciduous trees at the back.
- Trees should be grouped according to their height, irrigation requirement and nature of growth.
- Fruit trees that attract birds should be planted near watch and ward.
- Self-sterile or self-incompatible fruit trees requiring pollinizer should be planted mixed with pollinizer variety or the same should be side grafted on the fruit trees themselves to ensure optimum fruit set.
- While planting the trees, proper spacing should be adopted to accommodate inter-crops. Apart from this, vigour of tree and fertility of the soil should also be considered.
- Under semi-arid conditions, in-situ planting of rootstock can be taken up which facilitates grafting of desired scion at later stage of crop growth.
- Windbreaks should be planted at the rear end of the orchard. Trees suitable for this purpose should be tall growing, amenable for pruning and evergreen in growth. For example, *Eucalyptus*, *Casuarina*, Silver ok etc.

- Fencing the orchard with barbed wire or concrete wall or live-fence should be done well in advance to the planting of fruit trees.
- Nursery area should be located under shade, near water source and office building and should be easily accessible for transport of seedlings and raw materials like potting mixture, sand etc.

Observe about the features existing in the orchard visited by you and compare with the features of an ideal orchard. Record your observations in the data sheet. Ask the caretaker of orchard about the cultural practices being following to establish and maintain orchard of a particular fruit crop, fertilizers and plant protection measures being adopted and the problems faced in maintaining the orchard. Record your observations in the data sheet.

Exercise 1: Visit a model orchard and study its features. Record your observations and prepare a check list of features present in the orchard.

Exercise 2: Study of different aspects of orchard establishment and record your observations in the given data sheet.

Datasheet-1

Information about fruit plants growing in an orchard

Particulars	Fruit crops in orchard				
	1	2	3	4	5
Name of the variety					
Spacing and No. of plants/ha					
Layout system adopted					
Training system adopted					
Fertilizer application : Name(s) of fertilizer used , Dose applied, Time and method of application					
Blooming period initiation, Proportion of pollinizers, Peak flowering time i.e. full bloom)					

Time of harvesting					
Weed control: weedicide and dose used					
Nutrient deficiencies observed, if any					
Disease and insect-pest management,					
Any other particular cultural practice followed					
Constraints in orchard management, if any					

EXERCISE 1.3:
VISIT TO A VEGETABLE FARM

Objective :

- Acquaintance with different aspects of vegetable farm, raising of different vegetables, their cultural practices and identification

Delivery schedule : 01 period

Student's expectations/ Learning objectives:

- Studying the features of vegetable farm
- To know about different vegetables crops grown in a vegetable garden
- Cultivation practices adopted to grow vegetables

Pre-learning required: Knowledge about different vegetable crops

Handouts/material required/equipment's & tools: Paper sheet and pen to note down the instructions, forceps, hand lens, and pictures of different vegetables.

Introduction:

Cultivation of vegetables occupies an important place in agricultural development and economy of the country. Vegetable farming gives higher yield per unit area within the shortest possible time which ultimately increases the income. Several vegetables

are exported to foreign countries which provide an opportunity for earning foreign exchange. In addition, vegetables play an important role in the balanced diet of human beings by providing not only the energy-rich food but also promise supply of vital protective nutrients like minerals and vitamins that is why the vegetables have been reckoned as a protective food. It is indeed important for children to know about different vegetable crops, their nomenclature, at what time we grow them, how do we grow them, what are their important insect- pests and their control measures, what are the consumable parts of different vegetables and how do we harvest and market them.

Features of an ideal vegetable garden

1. **Proper sunlight:** Vegetables are sun loving crops and grow their best with 6-8 hours or more of direct sunlight. Leafy greens can manage to grow under less sun light while lettuce prefers cool weather and continue to grow throughout the summer if shaded by taller plants.

2. **Assured irrigation facility:** Ideal vegetable garden should be close to the source of water. Vegetables need water at regular intervals. If there is erratic water supply, vegetable crops exhibit various kinds of problems like poor crop stand, poor growth, cracking of fruits, improper fruit setting or prone to cultural problems like blossom end rot.

3. **Soil with good fertility status:** Soil is the most important factor in any garden and perhaps more so in a vegetable garden. Vegetables are short duration crops and have very high yield potential. They complete their entire life cycle by producing flowers and fruits and hence, they are very heavy feeders. A rich soil not only supports them to grow strong but also protect them from disease and pest problems. Therefore, the soil in the vegetable garden should be rich in organic matter and fertility status. Compost and composted manure can be added in spring and/or fall.

4. **Proper drainage:** One final consideration while selecting land for vegetable garden is that the area should have provision of proper drainage and run-off. Vegetables do not sustain under water logging conditions.

5. **Manure pit:** Manure pit is essential to dump the waste plant materials after the harvest of the produce and converting it to vermicompost or any other compost. This enables to supply considerable quantity of organic manure to the farm. This should be located in a corner of the vegetable garden.

6. **Protection from stray animals:** Proper fencing of the vegetable garden is essentially required to protect the crops from stray animals and also from theft.

7. **Store and packing house:** The store house and packing house should be in the centre of the vegetable garden for easy approach to the workers. They can take the implements, tools or inputs like herbicides, pesticides, fungicides, fertilizers etc., to the field and also bring backthe harvested produce for hydrocooling, sorting and packing to the market. In the store room, racks should be provided to keep the chemicals. Wooden plank (flat piece of timber) is arranged on the floor to keep fertilizer bags. The garden implements, tools and packing material etc. are arranged in the rack.

8. **Roads and foot paths:** These two components should occupy minimum space for the economy of transport. The metal road in the main areas is advantageous because it facilitates the movement of vehicles like tractor or lorry to carry fertilizers, pesticides and harvested produce etc.

9. **Cropping plan:** A comprehensive plan of different vegetables to be grown in the vegetable garden should be made well in advance keeping in view the principle that early the crop more shall be the price.

A planned vegetable garden

Ideal agronomic practices to be followed in vegetable garden:

You know the importance and necessity of different agronomic practices which are adopted to raise a healthy vegetable crop. So, it is imperative to understand the cultural practices which have been adopted to raise different vegetable crops in the

vegetable garden. You should have curiosity to inquire about the following aspects which determine the success of vegetable cultivation.

- Suitable variety/hybrids of different vegetable crops
- Reliable source for the procurement of vegetable seed
- **Optimum sowing or planting time:** It determines the environmental conditions at planting, flowering and fruit development stage and thus has direct impact on the successful cultivation of vegetable crops.
- **Proper spacing:** The closer planting results in overcrowding which ultimately hinder the access to proper sunlight and aeration and plants become more vulnerable to the attack of diseases and insect-pests.
- **Nutrient management:** The balance use of organic and chemical fertilizers enhances soil fertility and crop productivity.
- **Management of weeds , diseases and insect-pests at appropriate growth stages:** It is very essential as either of these may cause losses to crop yield to the tune of 30-60 per cent
- **Optimum irrigation at critical growth stage:** Irrigation at critical growth stages like flower initiation, fruit set and fruit development etc. are very crucial to exploit maximum production potential of different vegetable crops as they cannot withstand prolonged dry conditions.
- **Harvesting at proper stage:** Appearance, colour, tenderness and crispness determines the harvesting stage of a particular vegetable crop to fetch high premium in the market.
- Post-harvest handling of vegetable crops.

Ask the gardener about the cultural practices he is following to raise a particular vegetable crop, chemical fertilizers and plant protection measures he is adopting and the problems he is facing in managing the garden. Make your observations in the data sheet.

Exercise 1: Visiting vegetable farm and studying various agronomic practices to raise vegetable crops in data sheet.

Data sheet

1. Date of visit:

2. Cropping Season:

Name of the crop	Area sown under a particular crop	Date of sowing/ trans-planting	Name of the variety/ hybrid	Spacing	Growth stage	Insect-pest & disease incidence	Expected harvesting duration (days)	Expected yield	Remarks