Rhizoctonia mainly occurs on the leaves. They suck the sap from the leaves, causing slight deformation and silvery discoloration of the leaves.

**Control measures:**
- Mites can be controlled by spraying fresh water.
- Spray Karathane (0.5ml/lit) or Kethane (1ml/lit) or Magister (1ml/lit) or vertimec (0.4ml/lit).

**C. Caterpillar:**
It attacks occasionally on young leaves and flowers.

**Control measures:**
- Spray with Lannate (1g/lit) or Metasystox (1ml/lit) or Decis (0.5ml/lit).
- Hanging of yellow sticky pads.
- Soil application of thimet (2g/pot).
- Spray with Dimethoate (2ml/lit).

**D. Aphids or scale insect:**
Brown scales and balsam wooly aphids are found in groups in flower and the leaf as well as in the roots. Hence they are difficult to control by chemical sprays. Aphids can be identified by whitish deposits on the plants and brown scales can be identify by oval lumps on and beneath the leaves. A sticky layer is deposited on plants due to their secretion, which becomes black because of black moulds.

**Control measures:**
- Racking around plants.
- Hanging of yellow sticky pads.
- Spray with Decis @ 0.5ml/lit or Lannate @ 1.5glit.

**E. Sciaridae (Fungal gnats):**
Large numbers of sciaridae larvae attack the root.

**Control measures:**
- Hanging of yellow sticky pads.
- Soil application of thimet (2g/pot).
- Spray with Dimethoate (2ml/lit).

**F. Bacterial disease:**
1. Pseudomonas cattleyae: it is most important bacterial disease infecting orchids. It causes when the root collar of the plant has been wet for too long.

**Symptoms:**
- Disease can be recognized by characteristic brown patches on the leaves, having oily spots, surrounded by yellow rim. Initial infection shows dark pit in the leaf.
- Infected plants show poorer growth, small flowers and retarded development into full-grown plants. It also shows discoloration of flowers and chlorotic or necrotic spots on leaves.

**Control measure:**
- Avoid excess watering
- Drenching with Topsin or Roko (2glit of water)
- Soil application of thimet (2g/pot).

**2. Fusarium:**
It causes a black triangular spot with a yellow reddish discoloration at edges at the base of the old leaf. The leaf falls away completely. Fusarium is often caused when the root collar of the plant has been wet for too long.

**Control measure:**
- Avoid excess watering
- Drenching with Tospoxin or Roko (2glit of water)
- Soil application of thimet (2g/pot).

**3. Rhizoctonia spp.:**
- This fungus attacks young plant parts which come in contact with substrate at larger extent. Hot and humid conditions are suitable for its growth. White fungus hairs develop in the substrate, in which orange brown coloured mustard shaped fungus tissues, develop rapidly.

**Control measure:**
- Relative resistance to Rhizoctonia solani can increased by soil aeration, good drainage.
- Drenching with fungicide (Bavistin or Benomyl 0.2%) @ 3g lit before planting.

**4. Athelia rolfsii (Sclerotium rolfsii):**
This fungus attacks young plant parts which come in contact with substrate at larger extent. Hot and humid conditions are suitable for its growth. White fungus hairs develop in the substrate, in which orange brown coloured mustard shaped fungus tissues, develop rapidly.

**Control measure:**
- Drenching with quintal or rovral @ 1glit.

**5. Moulds:**
- Large fluctuation in the moisture content or the EC should be maintained at a sufficiently low level, pot temperature should be maintained at sufficiently high level and substrate should temporarily be kept dried.

**Control measure:**
- Drenching with quintal or rovral @ 1glit.

**H. Viral disease:**
- Infected plants show poorer growth, small flowers and retarded development into full-grown plants. It also shows discoloration of flowers and chlorotic or necrotic spots on leaves.

**Control measures:**
- Use of healthy planting material.
- Regular rouging of plants.

**I. Root problems:**
- It generally occurs when there is large fluctuation in quantities of nutrient and water as well as in substrate temperature. Excessive irrigation and poor drainage can also cause root necrosis. If roots are unable to provide water and nutrients to plants edges of the leaves become weaker and dull coloured.

**Control measures:**
- Avoid fluctuations in nutrient and water quality.

**HARVESTING & PACKAGING:**
After harvesting stems are kept in bucket containing water and stored under a temperature between 7 to 10°C. The vase life varies between 5 days to 6 weeks depending on climate and variety.

**POST HARVEST & PACKAGING:**
The orchids flower stem are supported with stick when flower buds begin to swell. The flowers are harvested when the last flower is still in bud stage.

**Control measures:**
- Drenching with Tospoxin or Roko (2g/lit of water)
- Soil application of thimet (2g/pot).

**Average flower production is 6 to 7 stems per plant per year.**
Introduction

Orchids are considered to be the world's most beautiful of God's creation, valued for their exquisite flowers and long keeping quality. They belong to the family Orchidaceae and are perennial herbs. Nearly 25,000 species of orchids spreading over 730 genera are reported in the World, besides hybrids produced regularly.

Orchids, which grow on trees, are known as epiphytes. Those that grow on the ground are referred to as terrestrial. Those that grow on rocks are known as lithophytes, while some relatively less known ones growing on decaying matter or rotting logs are known as saprophytes. A few orchids grow under semi aquatic condition, submerged in water and sometimes only the inflorescence reaching the surface.

Orchids exhibit two types of growth habits based on the type of vegetative growth as follows:

**Monopodial:** This type has a single non-branching stem, which grows upwards, their stem lengthening from one season to another, e.g. Vanda and Arachnis.

**Sympodial:** This type has a rhizome, which grows horizontally producing new growth. A well-developed sympodial plant contains a clump of shoots of different sizes and age. The growth of each axis ceases at the end of each flowering season. E.g. Dendrobium, Cattleya, Oncidium, Cymbidium. A single plant will thus produce a series of annual axis in course of time.

Sometimes an orchid plant grows simultaneously in the apical direction season after season as well as in the horizontal direction. These are known as pseudomonopodial.

**Propagation:**
1. Orchids are grown from seeds, vegetative propagules including rhizomes, hydathodes or leaves from which plants regenerate. This method is suitable for Dendrobiums, cattleyas etc.

2. Stem cuttings of 40 – 50 cms long with at least two well-developed aerial roots are ideal. If smaller cuttings are planted, propagation is much easier for a small-scale garden.

3. Off shoots or kiekies: Some orchids like Dendrobiums produce small plants with roots at the nodes of pseudobulbs. These are called ‘keikies’ meaning ‘babies’. These when sufficiently grown are to be separated carefully from the mother plant and potted independently or they may be attached to coconut husk shells and allowed to gain reasonable growth.

4. Back bulbs: The older shoots or canes of sympodial Orchids, which are lesser active physiologically, are called back bulbs. These may be severed off the mother plants and kept horizontally over a moist medium. After sometime they will strike roots and sprout. Then they can be separated and planted.

5. Method of planting:

**Terrain orchids:** Media comprising of one part rich humus with decayed leaf mould, one part of peat moss or coconut husk, one part of perlite mixture has to be prepared and a perfect drainage should be ensured. This mixture is put into pots or earthen pots. Sufficient drainage medium should be provided at the bottom. This should be in a sunny location and plants need to be staked.

**Epiphytic orchids:** A large number of growing media are in use as follows.

- **Coconut husk:** This absorbs sufficient quantity of moisture and is easily available and cheap. The proportion of husk has to be adjusted so it does not make the media soggy.

- **Tiles, bricks:** They absorb and retain moisture and are very useful for drainage purpose.

**Charcoal**

Charcoal is useful for purifying the media besides being handy and safe while planting an orchid. Large pieces of potting material are placed near the drainage hole and then the potting mixture along with the plant which should be staked. When growing in beds, similar care should be ensured. Special clay pots with holes are made for growing orchids. Plastic containers are also ideal as they are light in weight and do not allow algae to accumulate on their sides. Wooden baskets are specially used for Vandas as they have limited vertical growth. Raised platforms are constructed for placing pots in case of commercial cultivation.

**Humidity**

Orchids prefer humidity in the range of 60% to 80%. Over watering of orchids is not advisable. Watering interval also depends on the type of nutrients, their quantity and frequency of application depends largely on the type of orchid, potting medium, season of the year, growing conditions, stage of growth etc.

A fertilizer mixture containing NPK in the ratio of 1:1:1 is required during early growth at fortnightly intervals. Mature plants need to be fed with 3:1:1 ratio mixture during pre-flowering stage and 1:2:2 during flowering stage. Besides Organic manures like slightly fermented solution of oil cakes (1:10), cow dung (1:25), cow’s urine (1:2.5 dilution) are also very suitable besides bone meal which can be applied at intervals of 2 to 3 times a week under tropical condition.

A fertilizer containing major nutrients and minor nutrients is ideal for foliar application as most of the cultivated varieties are epiphytes and the media is usually highly porous. A fertilizer of 1:1:1 for early growth and 3:1:1 mixture may be used for mature plants as pre-flowering and 1:2:2 during flowering stage at fortnightly intervals.

**Water management:**

As orchid is grown on very porous substrate, it is important to supply the water to the crown portion by using sprinkler. The water must be free from any harmful chemicals or contamination. The quantity of water depends on climate, substrate and the age of crop. The irrigation system must be capable of supplying 5 to 12 liters of water / sqm / hour. It is very important to ensure that plants are provided with appropriate drainage.

**Nutrient Management:**

The type of nutrients, their quantity and frequency of application depends largely on the type of orchid, potting medium, season of the year, growing conditions, stage of growth etc.

- **A. Slugs and snails:** Slugs and snails chew round holes in the young plant parts. It can damage large number of plants within short period of time. Small snails and slugs can also attack root tips.

- **Control measures:**
  - Slug pellets in the pots and on ground can control them effectively.
  - Metaldehyde 6% @ 0.7g/m².