Cultivation of flowers and ornamental plants in greenhouses

- Protected cultivation is the technique of providing favourable environmental or growth conditions to the plants.
- In greenhouses, the growing environment is altered to suit the specific requirements of plants.
- It is rather used to protect plants from the adverse climatic conditions by providing optimum conditions of light, temperature, humidity, CO_2 and air circulation for the best growth of plants to achieve maximum yield and best quality.

Greenhouse

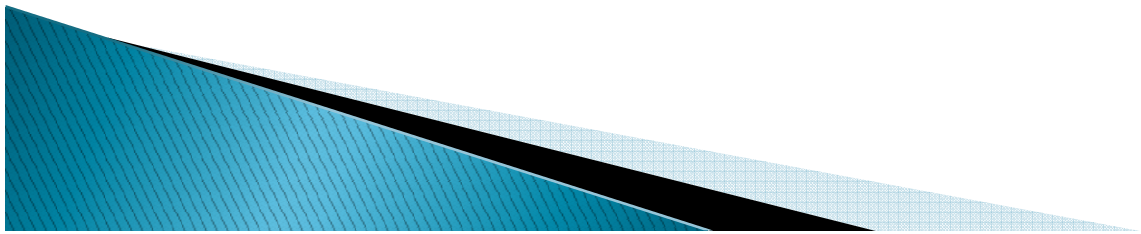
- A greenhouse is a covered structure which protects plants from vagaries of weather or environment i.e. wind, precipitation, excess solar radiation, temperature extremes and considerable attack of pests and diseases.

Principle of greenhouse cultivation

- The greenhouse is covered with a transparent material such as plastic, pvc sheet or glass.
- Based upon its transparency the greenhouse cover transmits most of the sunlight.
- The crop, floor and other objects inside the greenhouse absorb the sunlight admitted inside the greenhouse.
- These objects in turn emit long wave thermal radiations for which the greenhouse covering material has lower transparency and as a result of this the solar energy is trapped thus leading to increased temperature inside the greenhouse.
- This is known as greenhouse effect.

Why greenhouse cultivation

- Ensures the production of any plant at any place and throughout the year
- Blemish-free high quality product
- Easy to control insect-pests and diseases
- Water requirement reduces
- Labour requirement is less
- Earliness as it reduces crop duration



Basic considerations

- Feasibility study
- Type of greenhouse structures
- Planting material
- Growing system
- Plant protection
- Post harvest handling
- Supporting facilities for analyzing quality of water and growing media
- Management and coordination

Factors affecting the construction of greenhouse type

- Location
- Climate
- Design of greenhouse
- Greenhouse orientation
- Crops to be grown
- Cost of production
- Economic returns

Protected cultivation of ornamentals in India

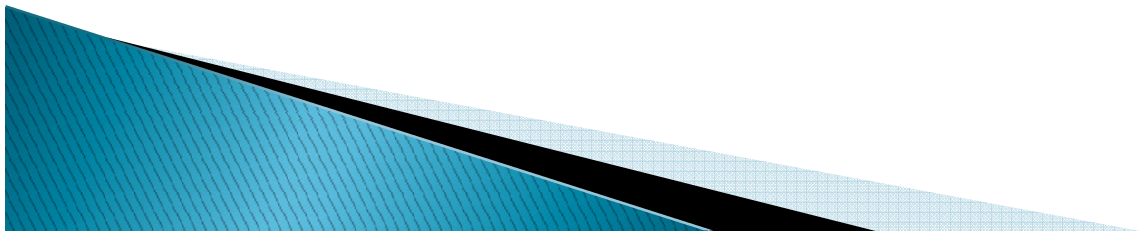
- Indo-American Hybrid Seeds Company has made greenhouses for cultivation of ornamental plants before 1970.
- M/s Feroz Masani and Sons of Nasik started growing carnations in greenhouses during 1980.
- M/s Pune flowers stared growing roses on rock wool in 1/4th acre greenhouse in late eighties for export at Pune.
- Presently about 250 private companies have started producing flowers in greenhouses in India.
- Total area under greenhouses in India is over 700 ha.

Advantages of growing ornamentals in greenhouse under Indian context

- Abundant sunshine throughout the year especially in autumn and winter
- The average radiation received at Quito-Equator and Nairobi is 434 and 462 cal/cm^2/day, respectively at 1800m AMSL the best centres in the world producing quality cut flowers, which is at par with radiation received at Bangalore (450 cal/cm^2/day at 1000m AMSL)
- Ideal temperature
- Shorter production cycle
- Good production during the main international events when demand for flowers is high in Europe and USA.

Ideal location of greenhouses in plains and hills

- In plains: North-south direction so that longer sides avoid sun scorching.
- In hills: South/ South-west/ South-east direction in hills for maximum use of sunlight

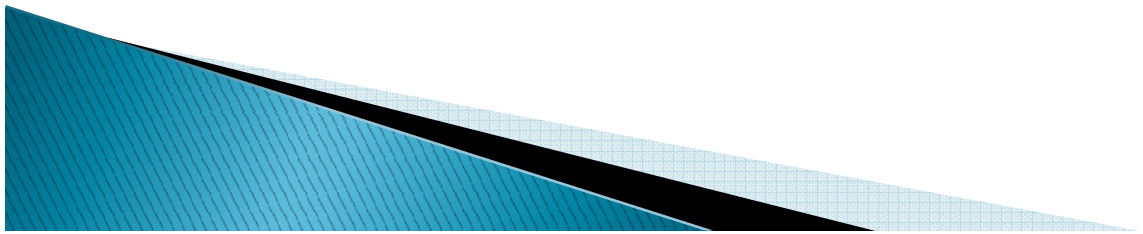


Different types of greenhouses

- Ground to ground
- Gable
- Quonset
- Modified quonset
- Tunnels (Fixed or portable)
- Lath house/ Seran house
- Lean to greenhouse

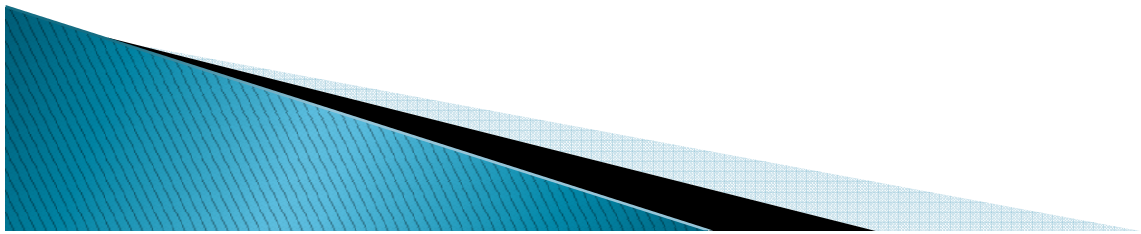
Different types of cladding material

- Glass
- Fiberglass
- FRP (Fibre Reinforced Plastic)
- Polythene (Thermo anti drip)
- PVC (Poly Venyl Chloride)
- Polycarbonates sheets
- Silpauline sheets



Growing conditions

- Temperature (Cooling, heating and shading)
- Relative humidity (Misting, fogging and watering)
- Light (Photoperiod and intensity)
- Air circulation (ventilation)
- Carbon dioxide
- Sanitation

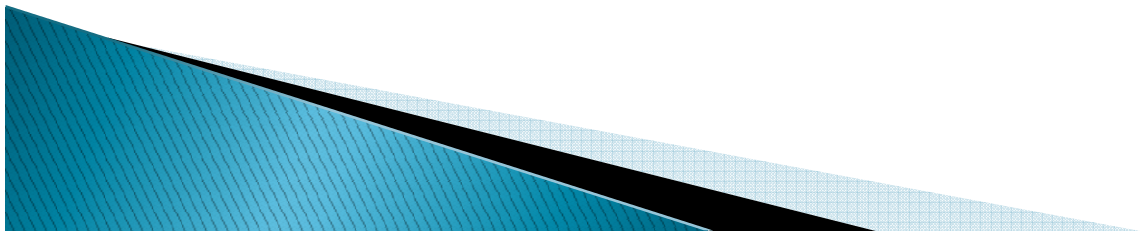


Growing systems in greenhouses

- Ground beds
- Raised beds
- Benches
- Pots

Growing media characters

- Provide adequate nutrients to the crop
- Support or anchorage the plants grown
- Good moisture holding capacity
- Sufficiently porous
- Not saline
- Withstand pasteurization with steam or solarization
- Free from weed seeds, nematodes

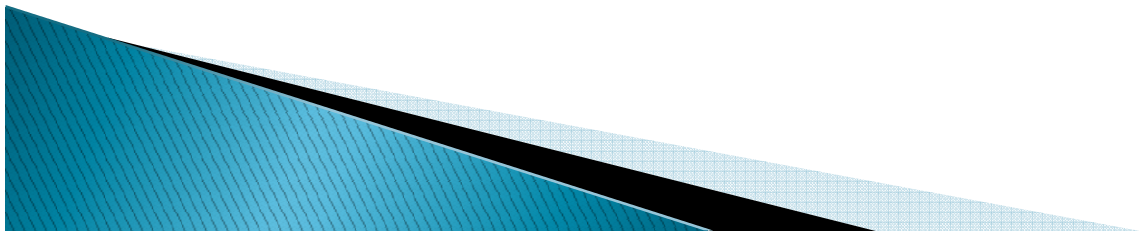


Dis-infection of growing media

- Chemical drenching/ fumigation: formaldehyde, chloropicrin, captan and vapam
- Steaming
- Pasteurization
- Solarization

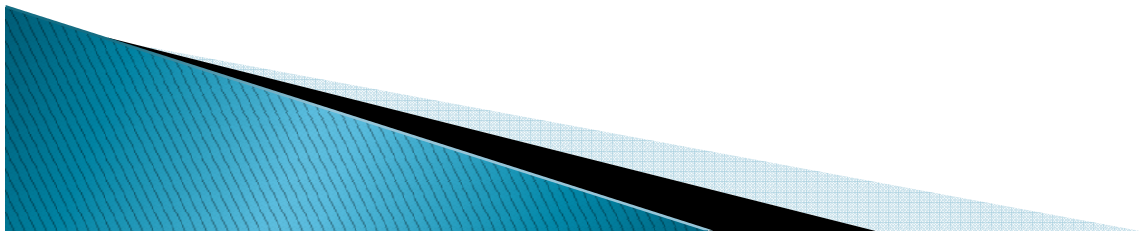
Irrigation

- In greenhouses mostly micro-irrigation technique is followed, which requires pressure and energy to work properly.
- The different ways to irrigate in greenhouses are given below:
- Drip irrigation
- Sprinkler irrigation
- Jet irrigation, and
- Spray irrigation



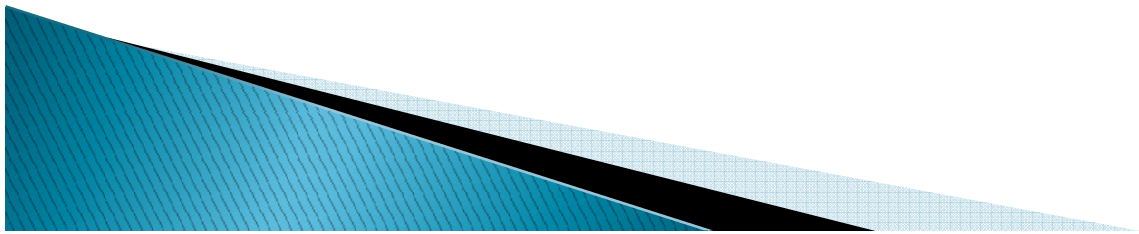
Advantages of micro-irrigation

- Saving water upto 75%
- Increasing flower yield
- Saving fertilizers upto 30%
- Suitable for undulating terrains
- Improves quality of the flower produce
- Saving energy and labour



Fertigation

- It refers to the simultaneous application of water and fertilizers to the root zone of the plants and it refers only to the drip irrigation system under the micro-irrigation technology.



Important ornamental crops

- Cut flowers (Rose, Carnation, Chrysanthemum, Gerbera, Anthurium, Orchids, Tulip, Lilium, Alstroemeria, Gypsophila, Licianthus, Statice, etc.)
- Cut greens (Asparagus, Ferns, etc.)
- Foliage pot plants (Aglaonema, Aspidistra, Dracaena, Ficus, Hedera, etc.)
- Flowering pot plants (Poinsettia, Begonia, Saintpaulia, Gloxinia, Geranium, Fuchsia, etc.)