

TYPES OF PROTECTED STRUCTURES

(2)

Types of protected structures:

1. **Net house:** These are simple framed structures which are of two types:
 - a) **Shade net :** These are perforated plastic (high density polyethylene)materials used to cut down the solar radiation and prevent scorching or wilting of leaves caused by marked temperature increases within the leaf tissues from strong sunlight. These are available in different colours i.e. black, green and white and shading intensities ranges from 25% to 75%. Leafy vegetables and ornamental greens are recommended to grow under these structures.
 - b) **Insect proof nylon nets:** These are available in different intensities of perforations ranging from 25 mesh to 60 mesh. Nets of higher mesh size are effective to control entry of insects and save crop from diseases.
2. **Plastic low tunnels/row covers:** These are laid in open field to cover rows of plants with transparent plastic films stretched over steel hoops of about 50 cm height spaced suitably along the rows. Polyethylene film of 30-40 micron thickness is used. Row covers used in vegetable production especially production of seedlings.
3. **Plastic mulch:** Plastic mulching is a practice of covering the surface around the plant to make conditions more conducive for plant growth through in-situ moisture conservation, weed control, better CO₂ exchange for root system and soil structure maintenance. It permits cleaner crop produce by avoiding the fruit contact with the soil.
4. **Trench cultivation:** Trench is a simple and cheap structure for growing vegetables in extreme winter even at -15 °C temperature. This harnesses soil and sun heat to create climate for growth of certain leafy vegetables. Trench cultivation has been found sustainable technology for production of vegetables round the year in cold climate.
5. **Floating plastic covers:** Transparent plastic sheet is used to cover large open field to protect vegetables from frost/snow and low temperature.
6. **Greenhouse:** A greenhouse is quasi-permanent structure, covered with a transparent or translucent material ranging from simple home-made designs to sophisticated pre-fabricated structures, wherein the environment could be modified suitable for the propagation or growing of plants. It is used to protect the plants from the adverse climatic conditions by providing optimum conditions of light, temperature, humidity, CO₂ an air circulation for the best growth of the plants to achieve maximum yield of best quality.

VARIOUS TYPES OF GREENHOUSES SUITABLE FOR VEGETABLE CULTIVATION

(3)

Greenhouses are framed structures of variable shape, size, above ground or semi-underground covered with transparent or translucent materials in which crops could be grown under partially controlled environment, which is largely enough to permit normal cultural operations. It is used to protect the plants from the adverse climatic conditions by providing optimum conditions of light, temperature, humidity, CO₂ and air circulation for the best growth of plants to achieve maximum yield of best quality.

Classification of greenhouses:

a) Based on cladding material: Greenhouses are covered with transparent or translucent material either fibre or ultra violet stable polyethylene film.

i) Fibre glass greenhouse: These greenhouse plastics consist of polyester resins, glass fibers stabilizers, etc. It has initial light transmission of about 80% and has high impact resistance with service life ranging from 6-12 years.

ii) Single or double polyethylene film greenhouse: The greenhouses are made up of polyethylene material which may be single layered or double layered. Polyethylene films are light in weight. For this double layered is highly preferred as it helps to absorb strong winds and snow sheds and also reduce heat loss during winter by 30-40%.

iii) Ordinary glass house: Using glass as cladding material has advantage of greater light intensity.

iv) Poly carbonate houses: The greenhouses made of polycarbonate sheet which has good light transmission of about 78% but reduces with age. It has excellent impact resistance and low inflammability.

v) Ultra violet stable polyethylene film house: This type of cladding material will last longer.

b) Based on structure: It is based on the material used in the preparation of frame.

i) Wooden framed : Structure having a span of less than 6m, wood is used for framing. Pine wood is used as it is inexpensive and possess the required strength. Timber is locally available can also be used for construction. These structures run the risk of termite attack.

ii) Pipe framed : Pipes are used for construction of greenhouse. Span is around 12m.

iii) Steel frames: Span is greater than or equal to 15m. Here flat steel or tubular steel are welded together to form a support.

c) Based on cost: The per square metre cost of greenhouse may vary from low to high depending on the material used and facilities provided.

i) Low cost greenhouse: Made up of supporting structure of G.I.pipe, angle iron, steel tubing. For covering ultraviolet stabilised plastic film of 200 micron thickness is used. Does not have any control system.

ii) Medium cost greenhouse: These have a cooling and heating arrangement and may have a double layer or ultraviolet stabilised plastic film.

iii) High cost greenhouse: It has many facilities like auto control mechanism of heating, cooling and humidification system, driup irrigation system, etc.

d) Based on climate control:

i) High-tech/Climate controlled greenhouses: These are constructed to achieve higher degree of climate control to enhance the cultivation period of crops. Evaporative cooling and heaters are used to maintain required temperature inside the greenhouse space. Used for growing high value crops like tomato, cherry tomato, sweet peppers, cucumber.

ii) Semi climate controlled greenhouses: In this kind of greenhouse, climate controlled through exhaust fans with evaporative cooling pads to maintain favourable temperature and humidity during summer. The basic cost of erection is half of climate controlled greenhouse.

iii) Naturally ventilated or low cost greenhouse: These are simple construction greenhouse with low initial cost. The frame may be of G.I.pipes, wooden logs or steel pipes but no heating and cooling systems are provided for the structure..Initial cost is less than half to that of semi-climate controlled greenhouse.

e) Based on shape/structural design:

i) Lean-to type: This design is used when a greenhouse is placed against the side of an existing building. It is build against a building , using the existing structure for one or more of its sides. It is limited to single or double row plant benches with a total width of 7 to 12 feet. Least expensive structure.

ii) Even span type : It is standard type and full sized structure, two roof slopes are of equal pitch and width. Used for greenhouse of small size and constructed on level ground. Cost is more than the lean to type.

iii) Uneven span type: Constructed on hilly terrain. Roofs are of unequal width, make the structure adaptable to the side slopes of hill. It is seldom used now-a-days.

iv) Ridge and furrow type : This design uses two or more A framed greenhouse connected to one another along the length of the eave. Side wall is eliminated between the greenhouse which result

in a structure with a single large interior. Consolidation of interior space reduces labour, lowers the cost of automation, improves personal management, and reduces fuel consumption.

v) Saw tooth type: These are similar to ridge and furrow type greenhouse except that there is provision of naturally ventilation in this type.

vi) Quonset type: in this type the pipe arches are supported by pipe purling running along the length of greenhouse. In general, covering material used is polyethylene. These are typically less expensive than the gutter connected greenhouses and are useful when a small isolated cultural area is required.