



Protected Cultivation: Addresses, Benefits and Challenges

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Protected cultivation is a process of growing crops in a controlled environment. This means that the temperature, humidity, light and such other factors can be regulated as per requirement of the crop. This assists in a healthier and a larger produce. There are various types of protected cultivation practices. Some of the commonly used practices are — forced ventilated greenhouse, naturally ventilated poly-house, insect-proof net house, shade net house, plastic tunnel and mulching, raised beds, trellising and drip irrigation. These practices can be used independently or in combination, to provide favourable environment to save plants from harsh climate and extend the duration of cultivation or off-season crop production.

Objectives of Protected Cultivation

- (i) Protection of plants from abiotic stress (physical or by non-living organism) such as temperature, excess/deficit water, hot and cold waves, and biotic factors such as pest and disease incidences, etc.
- (ii) Efficient water use with minimum weed infestation.
- (iii) Enhancing productivity per unit area.
- (iv) Minimizing the use of pesticides in crop production.
- (v) Promotion of high value, quality horticultural produce.
- (vi) Propagation of planting material to improve germination percentage; healthy, uniform, disease free planting material and better hardening.
- (vii) Year-round and off-season production of flower, vegetable or fruit crops.
- (viii) Production of disease-free and genetically better transplants.

Types of greenhouse/ polyhouse

1. Low-cost greenhouse/polyhouse: Low cost polyhouse is made of 200 micron (800 gauge) transparent polythene sheet supported on bamboos with jute sutli (ropes) and nails. It is used for protecting the crop from high rainfall. The temperature within polyhouse increases by 6-10 oC more than outside. In UV stabilized plastic film covered pipe framed polyhouse, the day temperature is higher than the outside. The solar radiation entering the polyhouse is 30-40% lower than that reaching the soil surface outside. During summers, the sides can be opened to moderate the temperature within the greenhouse in day time

2. Medium-cost greenhouse/polyhouse: A medium-cost greenhouse having slightly higher cost is quonset-shaped that can be made with GI pipe of 15 mm diameter. The structure is covered with single layer of UV-stabilized polythene of 200 micron thickness. It can be

naturally ventilated by providing openable windows along the sides and the roof or else exhaust fans may be used for ventilation. The fanpad system can also be used for humidifying the polyhouse, thus lowering the temperature. The life span of frame and covering material is about 10 years and 3 years, respectively.

3. High cost greenhouse/polyhouse: It is constructed with iron/aluminum structure (frame) having dome or cone shaped design. Temperature, humidity and the light are automatically controlled as per crop requirement. Floor and a part of side walls are made of concrete. It is highly durable but the cost is about 5-6 times. It requires qualified operator, proper maintenance, care and precautions during operation.

4. Other protective structures: Several types of protected cultivation are there with their own benefits and limitations. Here, we have provided the list of the most common types of protected cultivation:

Greenhouses: A greenhouse is a formation made of glass or plastic that allows for the controlled growth of plants. Greenhouses are commonly used for growing crops such as tomatoes, cucumbers, and peppers. They provide protection from external factors such as wind, rain, and pests and allow for the regulation of temperature, humidity, and light.

Net Houses: Net houses are structures made of netting or mesh that provide protection from pests and insects, allowing only air and light to pass through. Net houses are commonly used for growing vegetables and fruits, especially in regions where pests and insects are a major problem.

Shade Houses: Shade houses are structures made of shade cloth or other materials that provide shade to the crops. They are commonly used for growing plants that require less sunlight, such as ornamental plants and some vegetables.

High Tunnels: High tunnels are structures made of plastic or other materials that are used for growing crops. They are like greenhouses but are typically smaller and have a simpler design. High tunnels provide protection from external factors such as wind and rain while allowing the regulation of temperature and humidity.

Floating Row Covers: Floating row covers are lightweight materials that are placed over crops to provide protection from pests and insects. They are widely used for the cultivation of fruits and vegetables in those areas where insects and pests are a major threat to the crops.

Vertical Farms: Vertical farms use hydroponic or aeroponic systems that are used to grow crops in a vertical space. They are commonly used in urban agriculture and provide a way to grow crops in areas with limited space.

Each type of protected cultivation has its own advantages and disadvantages. You may choose the type depending on the factors like the type of crop being grown, the climate, and the available resources.

However, all types of protected cultivation provide a controlled environment that allows for the optimisation of crop growth and development, leading to higher yields and better-quality produce

Scope of protected cultivation in India

The scope in Indian horticulture is tremendous. If popularly organized, the promising fields having wide scope for protected cultivation in India are:

1. Cultivation in problematic agro-climate: In India majority of uncultivated space is beneath problematic conditions like barren, uncultivated fallow lands and deserts. Even a fraction of this space brought beneath greenhouse cultivation might turn out substantial returns for the native inhabitants.

2. Greenhouses around massive cities: The substantial demand persists for recent vegetables and ornamentals round the year in massive cities. Demand for off season and

high price crops additionally exists in massive cities. Thus greenhouse cultivation is promoted to fulfill the urban necessities.

3. Export of farming turn out: There are decent international demands for farming produce, chiefly the cut flowers. Promotions of greenhouse cultivation/ protected cultivation of export homeward crops are going to be of definite facilitating towards export promotion.

4. Greenhouses (GH) for plant propagation: Greenhouse technology is being currently a day's thought of as appropriate approach for rising of seedlings and cuttings that need management setting for his or her growth. GH facility might increase the capability and quality of manufacturing the stuff.

5. Greenhouse technology for biotechnology: Material generated through tissue culture area unit ought to be propagated up to speed setting. The aquiculture or Nutrient Film Technique (NFT) is needed controlled environmental conditions for growing plants.

6. Greenhouse for cultivation of rare and healthful plants: India has wide range of healthful herbs and rare plants like orchids that are known for big scale cultivation. The greenhouse might offer the proper style of environmental conditions for the intensive cultivation of those plants.