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Polyhouse Cultivation: A Modern Approach to Protected Farming

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Polyhouse cultivation is an advanced form of protected agriculture that enables crop production under controlled environmental conditions. A polyhouse is a specially designed structure covered with transparent or translucent materials such as polythene, glass, or polycarbonate, which allows the entry of sunlight while regulating temperature, humidity and other climatic factors. This technology plays a significant role in increasing productivity per unit area, improving crop quality and facilitating off-season production of high-value horticultural crops. Polyhouse cultivation is particularly effective for vegetables, flowers, fruits and nursery raising, as it offers protection from adverse climatic conditions, pests and diseases. Although the initial investment cost is high, the long-term benefits such as efficient use of water, fertilizers and labour make polyhouse cultivation economically viable. This article discusses the principles, types, advantages, planning aspects and applications of polyhouse technology in modern agriculture.

Keywords: Polyhouse cultivation, Protected farming, Greenhouse effect, High-value crops, Controlled environment agriculture.

Introduction

Polyhouse cultivation refers to the growing of crops inside a protected structure made of transparent or translucent materials that allow natural light to enter while controlling environmental parameters. The concept is based on the greenhouse effect, where solar radiation is trapped inside the structure, creating a favorable microclimate for plant growth. With increasing climate variability, shrinking land resources and rising demand for quality produce, polyhouse cultivation has emerged as an important component of modern protected farming systems. It enables farmers to produce crops throughout the year with higher yield and superior quality.

Principle and Working of Polyhouse

The working principle of a polyhouse is based on the greenhouse effect. Incoming solar radiation passes through the covering material and is absorbed by plants and soil. The absorbed heat is retained inside the structure, increasing the internal temperature and creating an optimal environment for crop growth. This controlled microclimate enhances photosynthesis, improves water-use efficiency and supports better plant development.

Types of Polyhouse

Polyhouses can be classified based on investment, structure, shape and environmental control.

(A) <u>On the basis of investment/ cost required</u>:

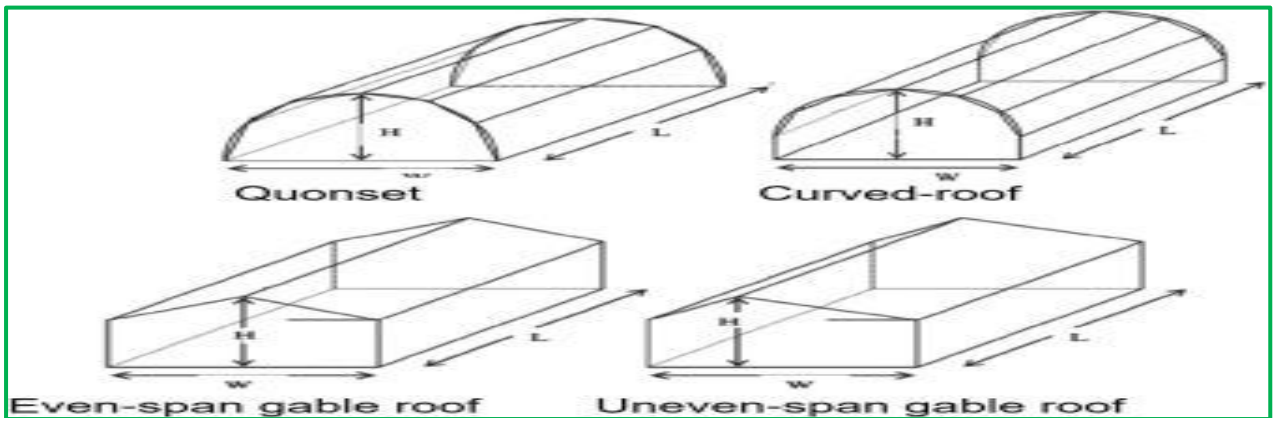
- Low cost or Naturally ventilated polyhouses.
- Medium cost or Partial climate-controlled polyhouses.
- High cost or Fully climate-controlled polyhouses.
- Plastic low tunnels Net houses.

On the basis of structural shape of frame:

- **Attached**: When it is attached or supported by a part of building or any type of constructed wall.
- **Detached**: When it is in free standing position.
- **Connected**: When several polyhouses are joined together in a series.

(C) On the basis of type structure:

- Quonset type.
- Curved roof type.
- Gable roof type.



(D) On the basis of glazing

- Fiberglass reinforced plastic glazing.
- Plastic film.

(E) Preparation of soil:

For a polyhouse, soil has to prepared under strict supervision by proper levelling and raised bed formation using fine sand and well decomposed cow dung or cocopeat.

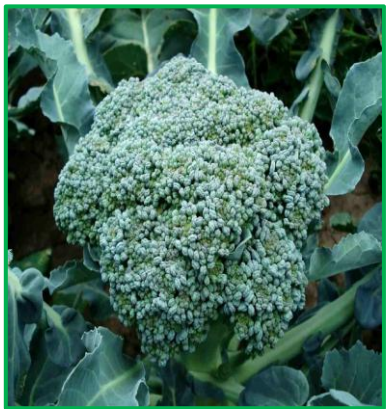
(F) Irrigation methods:

Proper irrigation method such as hand watering, tube method, overhead sprinklers, drip irrigation, mist system and polythene tubing must be employed.

Plants used in Polyhouse technology:

- **Fruits:** Strawberries, Dragon fruit etc.

- **Vegetables:** Mostly exotic such as Asparagus, Broccoli, Brussels Sprouts, Squash (zucchini), Celery, Cherry-Tomato, Chinese cabbage, Leek, Lettuce, Parsley etc.



Advantages and Limitations

Polyhouse cultivation offers several advantages such as protection from extreme weather conditions, off-season production, better control of pests and diseases, efficient use of water and fertilizers and production of high-quality crops. However, limitations include high initial investment, need for technical knowledge and reduced natural carbon dioxide replenishment.

Planning, Design and Crop Selection

Proper site selection, orientation, irrigation system, soil preparation and choice of covering material are essential for successful polyhouse cultivation. Polyhouses are widely used for cultivating high-value vegetables, flowers, fruits and for raising disease-free seedlings and hardening of tissue culture plants.

Conclusion

Polyhouse cultivation is a promising technology that supports sustainable and intensive agricultural production. Despite the challenges of high initial cost and technical requirements, its benefits in terms of yield, quality and resource efficiency make it an important tool for modern horticulture. Adoption of polyhouse technology can significantly enhance farmers' income and ensure year-round availability of quality produce.

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