

GREEN HOUSE OR POLYHOUSE TECHNOLOGY



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WHAT IS GREEN HOUSE



Greenhouses are frames of initiated structure covered with a transparent material in which crops are grown under controlled environment conditions.

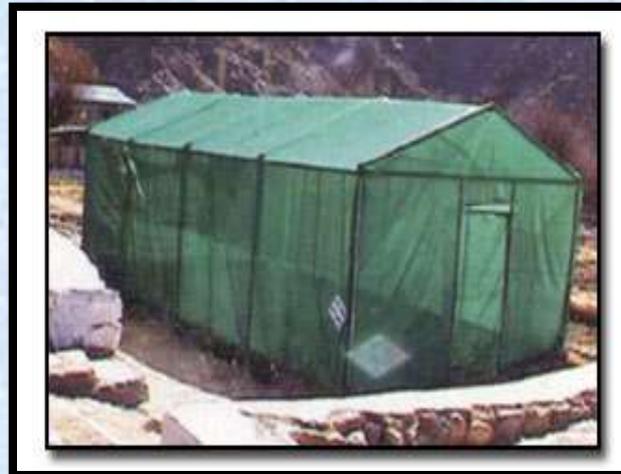
Greenhouse cultivation as well as other modes of controlled environment cultivation have been evolved to create favourable micro-climates, which favours the crop production could be possible all through the year or part of the year as required.



TYPES OF GREENHOUSES

Three types of green houses are found on the basis of cover material.

1. Polyhouse
2. Fibre reinforced plastic house
3. Glass house.



WHY POLYHOUSE TECHNOLOGY



- The fruits and vegetables are missing in the diet of poor marginal Indian because of their overall shortage
- Majority of farmers are not ready to shift their crop land to fruits and vegetable cultivation, hence under such condition poly houses can be the only answer for this.
- We need promotion of fruits and vegetables cultivation for financial support to the farmers and total food security to all
- The poly house technologies are advanced in Israel, Holland, Spain, Italy, Kenya, South Africa, Japan and China. But unfortunately much neglected in India.
- India and Holland having more or less same land under flower cultivation but in world's flower export, Holland's contribution is 70% and India's contribution is just 1% or even less because of advanced technology of poly houses in Holland.

Principle of the Polyhouse



❖ Growth and healthy production of plants under controlled favorable conditions in closed or partially closed space is called polyhouse.

Polyhouse concept emerged to undertake adverse environmental conditions such as excess of raining, high temperature, extreme cold condition, air flow etc.

Advantages of polyhouse

1. Protection from excess rainfall, wind current, scorching sunlight and extreme cold conditions.
2. It can be erected on unproductive soil.
3. Under minimum space one can have maximum production of plants
4. Humidity is maintained
5. Efficient use of CO₂
6. Minimum labor requirement
7. Minimum use of water and fertilizers
8. Maximum use of space
9. A single person can have control over thousands of plants
10. Diseases and pests can be controlled easily
11. Water can be used economically
12. Production of crop throughout the year
13. Protection from birds, animals and human activities
14. Labor cost is reduced
15. Quality of product is best



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CONDITIONS MAINTAINED IN POLYHOUSE

There are five different types of environmental parameters maintained in a polyhouse.

- 1) Light
- 2) Temperature
- 3) CO₂
- 4) Humidity
- 5) Air Flow

LIGHT

- Light is a most critical factor for poly house. The brightness of light is measured in LUX.
- For healthy growth of crop in poly house, minimum requirement of LUX is 50,000 to 60,000. In India, light LUX varies from 40,000 to 1,40,000 hence in many parts of our country such as Maharashtra, Karnataka, M.P. the sunlight is bright and has to be reduced by using shed net.
- We can reduce sunlight 30%, 50%, 75%. The 50% shed net are common in India.

TYPES OF LIGHT

- Along with the LUX, the wavelength of light is also important. On the basis of wavelength, Light is classified into three types Ultra violet light wavelength 0-400nm, Visible light wavelength 400-700nm, Infra red light wavelength 700nm onwards.
- From these three types, plants use only visible light for photosynthesis. In polyhouse technology light is controlled in such a way that plant receive maximum visible light and remaining light get reflected back i.e. outside the polyhouse.

TEMPRATURE

- ❖ For flowers and vegetables healthy and maximum growth, the temp requirement is between 26°C to 30°C during day time and 15°C to 18°C in night.
- ❖ The steel frame work of poly house is covered by polythene hence inner temp. can rise up to 40°C.
- ❖ To control the temp inside the poly house, the ventilation as well as cooling pads and fans are used.
- ❖ Because of this we can have continuous quality production of herbs throughout the year.

HUMIDITY

For flowers and vegetables, and their healthy and maximum growth, we should have proper humidity. Requirement of humidity for flower production is 65% to 80% and for vegetables it is 60% to 65%.

Because of controlled humidity plant growth remain continue, flower grow with attractive colors and after cutting, their shelf life also increases. Humidity helps in color combination of herbs, vegetable and flowers.

CARBON DI OXIDE (CO₂)

In our surrounding atmosphere CO₂ conc. is 0.03% means 300ppm. Plants use this CO₂ for photosynthesis. In poly house, during night time there is no photosynthesis but CO₂ is given out by respiration. This CO₂ remain accumulated around plants hence in night compare to outside, polyhouse always have more CO₂ conc.

This CO₂ is again used by plants growing in poly house for rapid photosynthesis. It has been proved that if poly house having 1000ppm of CO₂, then herbs, vegetables and flower production increases to 4 to 5 times more compare to normal conditions.

WIND MOVEMENT

If humidity is more in polyhouse, then chances of diseases and pest increases. Under such condition, side vents of polyhouse are opened to promote wind movement in polyhouse. Because of wind movement the humidity decreases and chances of diseases also reduced.

TYPES OF POLYHOUSES

- Uncontrolled -** where only top part is covered well (GH1)
- Partially controlled -** where polyhouse has open and closed window(GH2)
- Completely controlled-** where windows are absent. It is totally Computerized(GH3)

Polyhouses are also classified into 3 types

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





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TYPES OF POLYHOUSES

Polyhouses have different shape and sizes and on this basis they are classified in to three types –

- **Barrel shaped**
- **Ridges and furrow type**
- **Saw tooth type**

Shape and size varies according to the climatic conditions of the region/Country.





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Selection of site for polyhouse

Following things are taken into account

- 1 The selection Site should be free from pollution.**
- 2 Water should be available regularly**
- 3 Supply of electricity (Three phase) should be regular**
- 4 Soil should be properly leveled and drained**
- 5 Poly house should be near to road side means proper approachable road must be here to go to poly house**
- 6 Some space should be there nearby for further extension**
- 7 Expertise and labors should be available when required.**

Direction of Polyhouse

Poly house should have light from all sides and wind current should not damage the polyhouse.

To overcome these problems, Poly house should be preferably South-North in direction.



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Other Essential things

- 1. Should have cool chamber (0°C) to accumulate and store the final product.**
- 2. Water pH should be between 5.5 to 7 & electric conductivity of water should be 0.01 to 0.1**
- 3. PH of soil should be between 5.5 to 6.5 and electric conductivity 0.6 to 0.8.**

Material used for shading

- After construction of poly houses, it is covered by semitransparent sheet which can be a poly film, Acrylic, polythene, or polycarbonate material. Use of poly film is more profitable.
- Poly film protect UV rays to enter in poly house, transparency is between 80% to 90%. Gauge varies 200 to 800 micron. Poly film can tolerate 50°C and its life span is about three years. 1 kg poly film covers 5.38 sq m area of a poly house.

Preparation of soil

For poly house, soil has to be prepared under strict supervision. First the floor is leveled properly and then raise beds are prepared using red soil, fine sand and well decomposed cow dung or coco-pit. soil is disinfected using formalin solution and then used for growing the crops. Crops can be grown directly on the beds or in pots.

IRRIGATION METHODS

There are six different methods of irrigation as follows

- 1) **Hand watering:** Used for potted plants using Hose pipe and shower
- 2) **Tube Method:** Advanced and used for potted plant
- 3) **Over head Sprinklers:** Advanced in which Nozzles are mounted on risers. Good for ground beds. Sprinklers can also be in suspended position above the plant
- 4) **Drip Irrigation:** Also called 'I' Irrigation. In this method the water is given to potted plants by drip method at desired interval
- 5) **Mist System:** This system provide the water in the form of very fine spray. The mists are produced from sprinklers fitted with nozzles having very fine nano pores
- 6) **Polythene tubing:** In this method the perforated plastic pipes are used to water the plants growing on the beds. The polythene tubing can also be used between the rows

Micronutrients are given through irrigation system Pesticides are used by spray methods or through irrigation

Plants used in poly house technology are -

Floriculture: Roses, Orchids, Gerbera, Aster, Lilies, Marigold, Carnation, Chrysanthemum, Anthurium etc.

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

Landscape Plants: And all types of shade loving plants or foliage plant which require minimum light for healthy growth.

Polyhouse is also used for growing the seedling and hardening of tissue culture plants.

Gerbera grown in Polyhouse.

