



### PROTECTED CULTIVATION OF VEGETABLE CROPS

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#### Introduction:

Vegetables defined as those herbaceous plants of which some portion is eaten either cooked or raw, during the principal part of the meal. Vegetables play a major role in daily human diet since they are most important and the cheapest source of natural protective foods. They are rich source of carbohydrates, proteins, fats, minerals and vitamins which are required for maintaining the good health. The recent advent of vegetable production under protected condition has been a unique gift to the modern Olericulture. Protected cultivation could possibly extend the growing season. Protected cultivation of vegetable crops suitable for domestic and export purposes could be a more efficient alternative for land use and other resources (Sanwal *et al.*, 2004). It involves growing of vegetables under different protected structures like polyhouse, glass house or shading nets which are commonly called as green house. India grows the largest number of vegetable crops in the World and stands at 2<sup>nd</sup> place in vegetable production after China.

#### What is protected cultivation?

- The basic objective of protected cultivation is to protect the crop against major biotic factors like viruses, insects/pests and abiotic factors like extreme temperature (very low or very high), extreme humidity (low or high), extreme light intensity (radiation) and rainfall.
- The protected cultivation of vegetables offers distinct advantages of quality, productivity and favorable market price to the growers.
- Greenhouse technology provides a controlled and favorable environment for the crops to grow and high yield in all the seasons.
- Save crops from cold in winter, from heat in summer and from rain in monsoon.
- Environment can be changed according to the need of the crop.

#### Need of protected cultivation

- ✓ The demand of high value vegetables is increasing every year.
- ✓ The demand of off-season vegetables is also increasing.
- ✓ Increasing consumer population requires extra supply of horticultural produce, particularly of vegetables.
- ✓ Need to fulfill the consumers sufficient requirement cultivable area is decreasing day by day.
- ✓ Productivity of land has become stable.

- ✓ The productivity of almost all the vegetables in India is very low as compared to other vegetable growing countries in the world.
- ✓ To fulfill the daily demand of fresh and sustainable vegetables around cities.

#### **Advantages of protected cultivation**

- ◆ Protected culture offers maximum productivity.
- ◆ Protected system requires less labour.
- ◆ Input usage, particularly fertilizers and pesticides are controlled in protected system.
- ◆ Under controlled horticulture, water use is controlled and minimal.
- ◆ The major advantage of protected horticulture is high quality of produce.
- ◆ Off season nursery production.
- ◆ Protection from hails, rain, extreme weather, birds, rodents, animals with a covering which should be as cheap as possible.
- ◆ Three-four crops can be grown in a GH in one year due the availability of required plant environmental conditions.
- ◆ Protected cultivation of vegetables could be used to improve yield quantity and quality (Singh *et al.*, 1999; Ganesan, 2004; Shahak *et al.*).

#### **Objectives**

- \* To increase the area under protected cultivation of vegetables.
- \* To minimize constraints of growing vegetable crops under protected cultivation among people.
- \* To increase awareness about protected cultivation of vegetables among people.
- \* To increase quality and quantity of vegetable produce.
- \* To get opportunity for skilled and unskilled person especially unemployment youth.
- \* To increase contribution to the economy by increasing export of vegetables.

#### **What is Green House?**

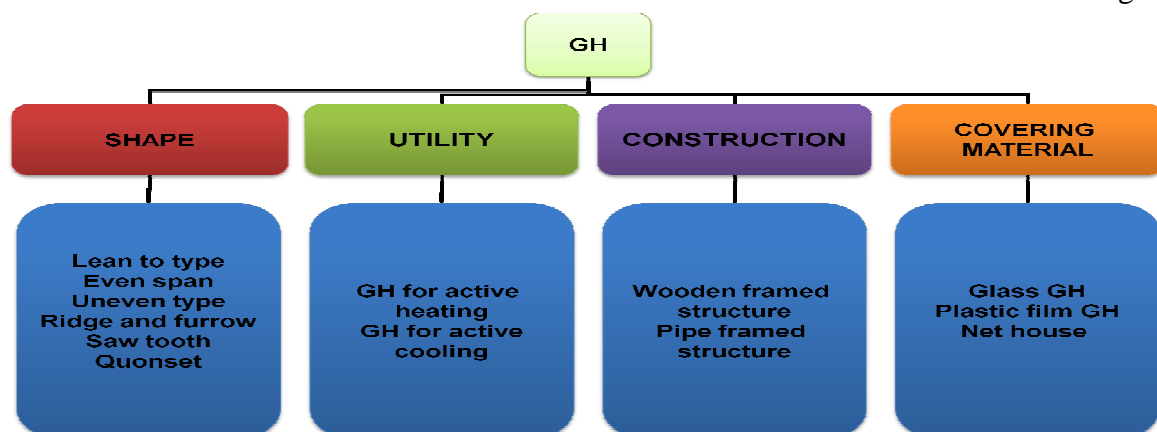
##### **GREEN HOUSE**

A greenhouse is a framed or inflated structure covered with a transparent or translucent material in which crops could be grown under the condition of at least partially controlled environment and which is large enough to permit persons to work within it to carry out cultural operations.

Greenhouse is a structure just like a house in which only sunlight is allowed to enter. It has mainly two parts:

1. A frame or basic structure and
  2. The covering material.
- Frame can be made up of GI pipes, bamboos, woods or iron rods.
  - While the cover can be of glass or plastic films.

- It allows precision farming and overcomes limitations of space and disadvantages of climate change.



### Greenhouse Operations A. Temperature Management

#### \*To reduce temperature

- 1) Use ventilation
- 2) Roof shading
- 3) Use fogger or mist
- 4) Sprinkler on the roof
- 5) Use cooling pads and exhaust fans

#### \*To increase temperature

- 1) Use heating pipes
- 2) Use thermal screens

### B. Control of humidity

#### # To increase humidity:

- 1) Total covered with polysheet
- 2) Use fogger or mist
- 3) Use cooling pads
- 4) Irrigate the crop
- 5) Regulate ventilation

#### # To reduce humidity:

- 1) Sufficient venting
- 2) Heating

### C. Control of light

- 1) Use good quality of polysheet
- 2) Use extra florescent electric tubes
- 3) Supplementary lighting
- 4) Training and pruning
- 5) Row orientation
- 6) Plant density

### D. Control of CO<sub>2</sub> and O<sub>2</sub>

- 1) Shut down ventilation and side covering during night.
- 2) Burning of charcoal.

### E. Irrigation management

- 1) The availability of adequate quality water is very important.
- 2) Quality of water is determined by considering its composition.
- 3) pH of water should be 5.5 to 7.0
- 4) Drip irrigation method is commonly used.
- 5) for operating drip system requirement of pressure is depend on purpose of operation.

### Points To Be Considered While Constructing The Greenhouse

1. Single span GH should be constructed in East-West direction.
2. For multispan GH, direction should be North –South.
3. Pipe framed structure should be used.
4. The slope of the roof should be 20 to 27%.
5. Avoid direct contact of UV covering material with the frame.
6. Wind breaks should be planted.
7. Wash the film from outside by sprinkling water frequently.
8. Slope of gutter should not be more than 2%.
9. Always use white paints for painting the frames.

### Site Selection

- The soil should have pH of 6.5 to 7.5.
- Availability of continuous source of quality water.
- pH of the irrigation water should be 5.5 to 7.0.
- The selection site should be pollution free (air & water).
- Facility of good roads for transport of greenhouse produce to nearby markets.
- Sufficient land should be available considering future expansion.
- Easy and cheap availability of labours in surrounding area.

### Bed Preparation

- Bed preparation is an important task in greenhouse as it remains permanent for 3-4 crops.
- Media is prepared by mixing the red soil, sieved sand, compost and rice husk in 1:1:1:1 proportion.
- Area should be clean and well leveled. Irrigate the area for loosening of the soil. Divide area in small beds of 4x4 m. size spread the soil mixture making layers one by one. Irrigate each layer while layering. Fully saturate the whole area for a day to suppress the mixture before disinfection. Actual soil sterilization should be done on the next day by means of any chemical disinfectant viz. with formalin, methyl bromide or chloropicrin. After sterilization it should be cut into beds of convenient size making complete blocks.

### Vegetable Crops Grown Under Greenhouse Conditions

**Fruit Vegetables:** Tomato, Brinjal, Chilli, Okra, Sweet pepper.

**Cole crops:** Cabbage, Cauliflower, Sprouting Broccoli, Brussels Sprout.

**Cucurbitaceous Vegetables:** Cucumber, Bitter melon, Bottle gourd, Pumpkin, Sponge gourd.

**Leafy Vegetables:** Asparagus, Fenugreek, Lettuce, Leek, Spinach.

**Underground Vegetables:** Onion, Beet root, Radish, Carrot.

### Constraints

- Non availability of required technology for production of vegetable crops and their post harvest management.
- High initial cost of investment.
- Lack of awareness among the farmers pertaining to potential of protected cultivation.
- Lack of market information to enable advanced planning for production and marketing etc.
- Lack of capital formation, large, small and marginal farmers.
- High interest rates for vegetable investment and export finance.
- Lack of water resources.
- Non-availability of labour.

### **Future Potentialities**

The greenhouse technology is still in its preliminary stage in the country and concerned efforts are required to bring it at par with the global standards.

- ✓ Concerted and continuous efforts are required to develop the required indigenous technology suitable for our country rather than the western technology.
- ✓ Economically viable and technologically feasible greenhouse technology is needed.
- ✓ Greater information about greenhouses among the farming community in the country is required.
- ✓ The Govt. should encourage farmers by providing timely subsidy for taking up this new technology in a big way.

### **Conclusion**

- From the above discussion it is concluded that, under greenhouse condition temp., humidity and CO<sub>2</sub> level can be effectively maintained.
- Greenhouse technology is highly productive, amenable to automation and conserves water and land. It helps in increasing quantitative and qualitative production of vegetable crops as compared to open field condition.
- To achieve the foreign exchange, greenhouse cultivation is important to increase export potential of vegetables.
- In the 21<sup>st</sup> century, protected cultivation is likely to be common commercial practice because of its potential.

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