

Protected Cultivation Special Reference to Fruit Production

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SUMMARY

India is second largest producer of fruit crops in the world, still we are behind in export potentiality, productivity and quality of fruits, because of climate change over the year, low productivity, low land holdings, rain fed farming, improper utilization of natural resources, over emphasis on chemical fertilizer and pesticides. The demand of fruits is increasing day by day because of increasing population over the year and they require large quantity of fruits to full-feel their requirement, it is possible when the fruit crop can be grown under the protected structure. Growing of fruit crops in protected structure improve the yield, productivity as well as quality production of fruits. It's also enforce to off-season production of fruit crops to help availability of fruits in the market throughout the year

INTRODUCTION

Growing fruits under location-specific suitable structures may accrue substantial benefits even to small growers. In fact, it has been frequently described as the “greenhouse industry”, emphasizes the important role of technology in the whole process (Bakker and Challa, 1995). Protected cultivation offers several advantages to produce fruits of high quality and yields, thus using the land and other resources more efficiently. This becomes relevant to growers in India who have small land holding, say less than one hectare. They would be interested in a technology, which helps them to produce more crops each year from their land, particularly during off-season when prices are higher. Eckstein *et. al.*, (1998) found protected cultivation increased yield by 28% in experimental planting done in South Africa (71 t/ha compared with 56 t/ha per year).

Fruit production under protected structure is more profitable than open field conditions. Even if the protective structures are cost effective, proper planning, management and attention to details are needed to achieve maximum benefits. In order to overcome disadvantages caused by local climatic conditions, one has to go for protected cultivation to produce desired quality fruits. It also promises the productive yield and quality improvement with good benefit cost ratio. Compared to open field cultivation, greenhouse horticulture offers the possibility of year round production, higher yield by better control of pathologies and climate and higher water use efficiency Stanghellini *et. al.*, (2003).

What is Greenhouse?

Greenhouse is a frame inflated structure covered with transparent or translucent material in which crops are grown under partially or fully controlled environmental condition and which having enough space to carry out the cultural practices. This technology has great potential especially in peri urban agriculture in near future, since it can be profitably used for growing high value fruits like strawberry, grapes, banana, papaya, mango, orange, guava, pineapple etc. and for off season cultivation of fruits and their healthy and virus free seedlings. Protected cultivation of fruit crops offers the best choice for diversification in agriculture production for a number of reasons. Production of crops under protected conditions has great potential in augmenting production and quality of fruit crops in main and off season and maximizing water and nutrient use efficiency, under varied agro climatic conditions of the country. The main purpose of protected cultivation is to create a favourable environment for the sustained growth of plant so as to realize its maximum potential even in adverse climatic conditions. Greenhouses, glass house, rain shelters, plastic tunnels, mulches, insect -proof net houses, shade nets, lath house, cold frame, hot beds etc. are used as protective structures and means depending on the requirements and cost-effectiveness. Besides modifying the plant's environment, these protective structures provide protection against wind, rain and insects.

Protected cultivation in partially modified environment structure is useful in combating both biotic and abiotic stresses that limit the productivity and quality of fruit crops. This requires careful planning and attention to detail, including timing of production and harvest to coincide with high market prices, choice of varieties

adopted to the off season environment, and able to produce economical yields of high quality produce etc. According to Galan Sauco *et al.* (1998), protected cultivation produced more than 20% heavier bunches and annual yields in the Canary Islands plantings in comparison with open-field cultivation.

Why Protected Cultivation?

Now in days population is increasing sharply and due to modernization or infrastructure work is increasing day to day, agricultural land is becoming less and less. Also, world water resources are fast diminishing. The one and only answer to this problem is application of new technique/technology in agriculture. Greenhouses have proven to be a reliable solution to achieve these goals; however, protected agriculture has the potential to lead to serious problems. Therefore, the main benefit of protected cultivation is,

- Environmental conditions can be controlled e.g. lighting, temperature, humidity.
- Plants can be grown in places where plants cannot normally grow.
- Plants can be grown out of season or allows a longer growing season.
- Less impact on the surrounding environment through efficient land and resource utilization.
- Crops can be grown at greater densities leading to higher yields.
- Harvesting does not depend on weather.
- Control of crop disease may be more effective as infection may be restricted to a single glasshouse/ polytunnel.
- Efficient use of resources.
- Nursery raising and hardening of plant.

Media Use in Greenhouse

1. Ground culture or Geoponics

In ground culture, also known as soil culture, crops are raised on level ground as well as in mounded beds. The soil should be well drained, fertile, have a medium to light texture and be high in organic matter.

2. Hydroponics

The word hydroponics technically means working water, stemming from the Latin words “hydro” meaning water, and “ponos” meaning labour. Hydroponics is a subset of hydroculture and is a method growing plant using mineral nutrient solutions, in water and without water.

3. Soil-less culture

Growing of fruits in the media other than soil is called soil-less culture. Soilless culture is a method of growing plants without soil. Ex: Peat, Perlite, Vermiculite, Sphagnum moss, Leaf mold, Bark, Rockwool, Polystyrene film, rice hulls, etc.

4. Aeroponics

It involves the growing of plants in a trough or container in which the roots are suspended and sprayed with a nutrient mist. The rooted plants are placed in a special type of box with computer controlled humid atmosphere. It is relatively new production system used especially for research purpose.

1. Ground culture or Geoponics



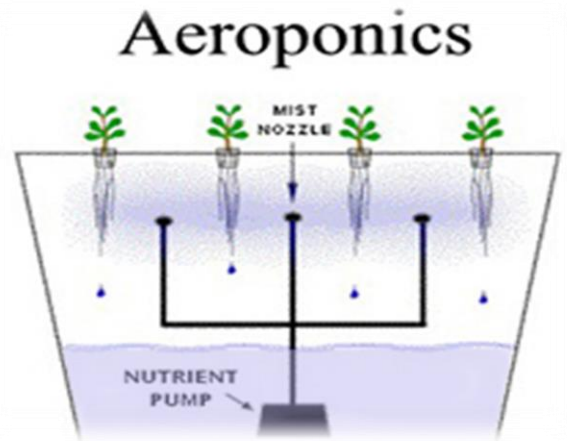
2. Hydroponics



3. Soil-less culture



4. Aeroponics



Characters of Fruit Crops for Protected Cultivation

1. Fruit plant should be rapid grower like papaya, banana and strawberry.
2. It should have dwarf characters and show good response to training and pruning.
3. Single stemmed fruit crops are suitable for the protected cultivation.
4. The varieties selected should be regular bearer with high yielding.
5. Short duration and early varieties should be selected for the cultivation.

Type of protected structure

1. Green/ Poly house



2. Net House



3. Glass house



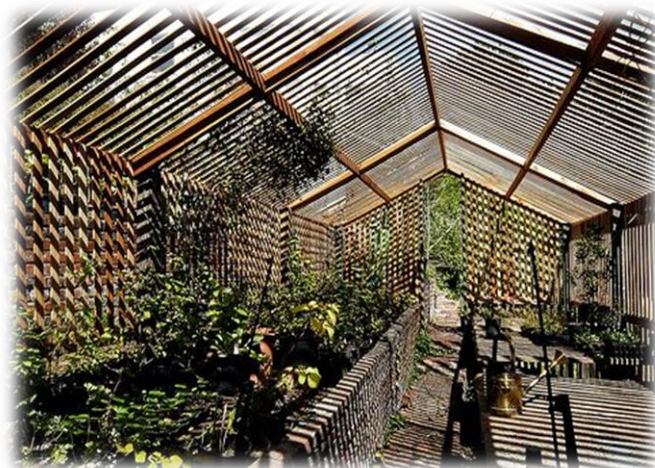
4. Plastic tunnel



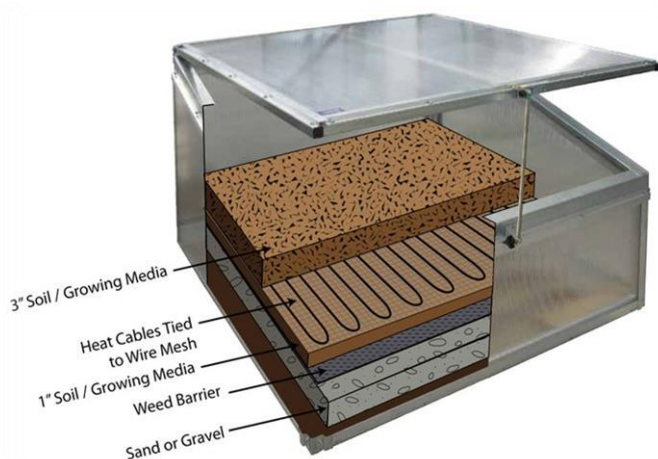
5. Mulching



6. Lath House



7. Hot beds



8. Cold frame

**Advantages of Protected Cultivation**

- Gives protection against wind, heavy rainfall, hail storm and other unfavorable conditions
- Produce export quality production for international standard before season of fruit crops.
- Considerably increase the productivity of fruit crops.
- Efficient use of chemical and fertilizers that lower the cost and healthier produce.
- Use of unproductive soil i.e. the construction of greenhouse on barren land.
- Increase the self employment as well as increase the employment for educated rural youth.
- Reduction in labour cost as well as increase the work efficiency.
- It helps for improving in micro climate.
- Efficient use of space and CO₂
- Year round production allowing farmers to take advantage of market seasonality and higher prices.

Disadvantages of Protected Cultivation

- High cost of initial installation.
- Maintenance cost of protected structure is very high.
- Non-availability of various component.
- Need of skilled labour for special practices.
- Knowledge of various factors are required to effectively control climate inside the greenhouse.

CONCLUSION

Protected cultivation one new technology to protect crop from natural calamities, biotic and a biotic stress. Protected cultivation is developing very quickly and becoming profitable day by day for the growers. Protected cultivation of fruits is beneficial for producing quality production for export. Fruit production under protected structure is more profitable than open field conditions. Even if the protective structures are cost effective, proper planning, management and attention to details are needed to achieve maximum benefits. Protected cultivation production system offers great scope to produce organic fruit, minimize insect pest incidence, avoid fruit cracking, prevent frost injury, hardening of tissue culture as well as cutted, budded, layered and grafted plants. Production technology of each crop under protected condition should be standardized. There is a need for the further research in other fruit crops regarding protected cultivation. Also, there is a need to focus on the improvement in the structures, growing techniques and physiological studies of the plants to enhance the quality of the fruit crops. The protected cultivation promises the productive yield and quality improvement with good benefit cost ratio.

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