

Protected Cultivation -A Ray of Hope for Small and Marginal Farmers

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What is protected cultivation?

Protected cultivation can be defined as the science or process of growing crops in a controlled environment. Using this technique, a controlled micro climate is provided which affects the developmental growth of a plant. As per the needs of the crop, factors like temperature, humidity and light can be modulated. This results in a healthier and larger produce, at times with minimal wastage of resources. Currently it is used for rearing a variety of floral plants, vegetable crops, spices and medicinal and aromatic plants under specific climatic conditions. In India, farming of vegetables and high value horticultural crops was introduced via the Indo-Israel project, at Indian Agricultural Research Institute in New Delhi in 1998.

Majority of the uncultivated land in India comprises of barren, fallow lands and deserts. Using protected cultivation, a small portion can be cultivated thereby providing Additionally cities have the scope to include greenhouses in their infrastructure to meet the need for exotic crops and ornamental flowers. The surplus can be exported to other places which have a higher demand for these crops or flowers but are unable to cultivate them.

Flowers	Chrysanthemum, Carnation, Gerbera, Rose, Liliun Orchid, Gladiolus
Vegetables	Tomato, Yellow and Red Bell peppers, Cucumber, Broccoli, Red cabbage, Radish
Fruits	Strawberry, Melon
Seedlings and nurseries	Vegetables, Flowers, Tissue

culture, Fruit grafting

Crops grown under protected cultivation**Advantages**

There are several advantages to this technique of cultivation. The plants are shielded from abiotic stresses like frost, rain and extreme heat. Due to optimum conditions being provided, there's improved germination, plant growth and early maturity of crops. There is a 40-50% reduction of water consumption and effective utilization of resources. Since they are cultivated in an enclosed environment, exotic and off-season vegetables can be grown throughout the year which can be used to meet the demand. There are more opportunities for self-employment which significantly reduces expenditure that would have otherwise been spent on labour. Since the plants are being reared in a contained environment, it can also be used in the conservation of different species or to produce generations of new varieties. There are almost negligible chances of disease outbreak and pest attacks, thereby minimizing the need for pesticides.

Disadvantages

A major disadvantage is that the initial cost of investment is high due to the need for specialized infrastructure. Apart from this, since so much capital is being spent on providing optimum conditions to the plants, there must be a demand for them, in addition to proper marketing. It also requires technical knowledge of how to cultivate crops in a protected environment. Since it is labour intensive, close supervision and monitoring is a requisite. As the infrastructure is highly technological, continuous repair and maintenance is required to ensure smooth working of the facilities.

Different types**Greenhouses**

The most simple and efficient technique, it can be used for increasing crop productivity per unit area and increasing the vegetable produce. Depending on space constraints and the need, they can either be small sheds or industrial sized buildings.



Hi Tech Polyhouses

This is mostly used for vegetable cultivation since they take up less area and their period is short. Out of all the protected structures it is the most expensive one and is also known as a fan and pad poly house. The high cost is since all the operations like irrigation, temperature modulation, are controlled by computers. Although higher costs means, it's not very popular, the crop production output from these structures is higher compared to other structures.



Tubular Poly house

Less than hi Tech, these structures are manually operated. The structure is made up of stainless steel and the wall and roof is covered with a polythene sheet. Since the internal temperature is higher than the external conditions, it improves photosynthesis and encourages plant growth.



Wooden

Identical to the tubular structure, the supporting structures are made of bamboo or wood. There is no device for modulating the internal temperature.



Shade Net

Less costly than other structures, it is utilized in the development of horticulture crop seedlings. In addition to maintaining air and soil moisture, it protects crops from ultraviolet radiation and extreme temperatures. Shade net plastic material is available in different percentages like 15%, 35%, 40%, 50%, 75% and 90% which permits a certain amount of light to enter depending on the percentage material used. It also comes in a variety of individual colours like white, black, red, blue, yellow or green or in combinations.



Walk in Tunnel

Smaller in size, this is the structure most commonly adopted by farmers. It can be used in the cultivation of crops and flowers. It has a lower initial cost and this is the reason for its popularity amongst farmers.



Plastic Tunnel

These are mostly utilized as small-scale raising nurseries and assist in early seed germination. In this, year-round cultivation can be done.



Plastic mulch

Use of mulch films helps in reducing loss of moisture via evaporation as well as minimizes weed growth. It is usually covered by a plastic sheet.



Cases of success

The areas where protected cultivation is practiced widely is in Chattisgarh, Odisha, Andhra Pradesh, Gujarat, Madhya Pradesh and Maharashtra. In the upper regions of the Himalayas, Greenhouses have been established to produce off season vegetables to feed the local community that resides there. Ladakh is another example of where production of vegetables under greenhouse cultivation is practiced. During winter months, in Uttar Pradesh capsicum cultivation is performed using a hi tech polyhouse. In Uttarakhand studies were undertaken to see the effect of bamboo framed polyhouses on the cultivation of vegetable pea, summer squash and tomato plants. In Srinagar, a walk in tunnel type polyhouse was devised to cultivate strawberries with the help of mulching and drip irrigation. This was constructed to enable it to tolerate heavy snow and high wind pressure.

Conclusion

Recent trends have seen protected cultivation make use of exotic crops and ornamental plants along with other farming practices like Aquaponics, Hydroponics, Azolla cultivation, organic farming and vertical farming to ensure the farmers obtain maximum output from the minimum resources they have at hand. Training programs aimed at farmers residing in rural areas especially, should be organized on a more frequent basis at agricultural universities and it should be either at a minimal cost or free of charge. Training on greenhouse fabrication, installation, and maintenance should be provided to farmers, technicians, and entrepreneurs, and integrated crop management methods should be developed to maximize the benefits of greenhouse cultivation. This will encourage them to look at more options for long term sustenance rather than just follow conventional farming methods. The biggest setbacks are the market price fluctuations, lack of high quality seeds and absence of standardization of rates. In the current climate change scenario, the focus should shift from modern agricultural methods to smart agricultural methods. Work is currently ongoing to establish a greenhouse structure that has negligible impact on the environment.

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