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Techniques of protected cultivation

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Introduction

A better method of cultivating crops in a regulated environment is called protected farming. It shields the crops from biotic (diseases and insect pests) and abiotic (temperature, rain, wind, humidity, etc.) stresses. Regarding market prices for the growers, productivity, and quality, growing vegetables in a greenhouse offers distinct benefits over growing them in-season. Europe, the United States, and Canada are among the countries that use greenhouse technology extensively. It overcomes spatial limitations and the adverse effects of climate change to enable precision farming. Numerous environmental elements, including air quality, temperature, humidity, and the composition of atmospheric gases, are regulated in these systems. Utilizing low tunnels, net houses, mulches, greenhouses, and other forms of protected agriculture provides a number of benefits for producing high-quality and high-yield crops while making better use of the available space and other resources. Compared to open-field farming, shielded horticulture uses distinct management techniques. In peri-urban locations, multistory agricultural farming in greenhouses has become important due to the continuously expanding population. Natural ventilation polyhouses, mulching, drip watering, fertigation, and other techniques are examples of protected cultivation technologies. In India's northern plains, walk-in polytunnels have recently been constructed, proving that they are a viable option for growing cucurbits, tomatoes, and capsicums as well as for rearing nursery stock in the off-season. Horticultural crops grown in open fields face a variety of challenges, including high insect pest infestation pressure (**Nguyen *et al.*, 2009**), heavy rain, thunderstorms, excessive solar radiation, temperatures and humidity levels above plant growth optima, and fungal diseases. The most important determinant of horticulture crops is the environment (**Trivedi**

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and Singh, 2015). Vegetables of superior quality in terms of shape, size, and colour are also produced by vegetables cultivated in protected environments. Because of the favourable inside microclimate, vegetable production is higher than in open fields and consequently fetches a higher price. It will enable regular storage of the commodities, enhance quality, raise yield, and further extend the harvest season.

Advantages of Protected cultivation

1. A three to four times higher yield in terms of yield per unit area and per unit input.
2. Both the size and quality of the produce have improved.
3. Certain flowers and vegetables can be produced both year-round and in off-seasons.
4. It is possible to preserve valuable horticultural crop germplasm.
5. It is feasible to produce disease-free seedlings and transplant horticulture crops.
6. It gets easier to breed crop kinds and hybrids and produce their seeds.
7. It is possible to employ uncultivated and barren land by implementing soilless cultivation of certain crops.
8. Both in rural and urban regions, protected horticulture has a huge potential to create jobs for educated youth.
9. It makes soilless nursery production techniques like tissue culture, grafting, and wood plugging possible as well as soilless horticultural crop production

techniques like hydroponics and aeroponics.

Constraints of protected cultivation

1. High capital costs associated with initial infrastructure.
2. The lack of competent labor and the need to replace it locally.
3. Insufficient technical expertise in cultivating crops within protected structures.
4. Every operation is labor-intensive and demands continuous effort.
5. Maintenance and repair are significant obstacles.
6. Requires certain marketing because a significant amount of time, money, and effort are anticipated to be invested.

Type of protected structures

1. **Climate controlled greenhouse**
2. **Zero energy naturally ventilated greenhouse:**
3. **Shade net house:**
4. **Insect-proof net house**
5. **Walk-in-tunnel**
6. **Low tunnels**

Scope and importance of Protected cultivation

India didn't begin using greenhouse technology until the 1980s, and then just for research purposes. These have gotten better further after the liberalization of the Indian economy in 1991. Currently, the private sector has created divisions that are solely focused on exports. The regularity of supply, quality, and consequent acceptance in offshore markets have been met with considerable success in these efforts to achieve export criteria. When it comes to the acceptance of quality standards, exports have shown very promising results in key international cities like Mumbai, Delhi, Pune, and Kolkata, which offer excellent facilities for experts of live plant material for creating and exporting flowers to developed countries. Bulb-quality flowers, as well as loose and cut flowers, dry flowers, decorative plants, and cut foliage, are best cultivated in greenhouses. In addition, greenhouse technology provides marginal farmers with the means to increase productivity and quality through high-tech, technology-based farming. The Indian government implements a range of protected cultivation projects at both the central and state levels with the aim of promoting the use of these advanced plant growth methods. In order to facilitate the adoption of protected farming for high-value horticulture crops, national agencies such as the National Horticulture Board (NHB), National Horticulture Mission (NHM), Mission for Integrated Development of Horticulture (MIDH), and Rashtriya Krishi Vikas Yojana (RKVY) raise awareness among farmers and offer financial support.

Prospective Approaches:

- ❖ Establishing benchmarks for suitable polyhouse construction designs, using economical cladding and glazing components.
- ❖ Creating low-cost agricultural techniques to cultivate a variety of vegetables and control the greenhouse climate.
- ❖ Training proficient and expert producers of polyhouses.
- ❖ The ICAR and SAUs should begin large-scale research studies on producing vegetables under protection.
- ❖ It is critical to increase farmer knowledge of the possibilities of protected vegetable production.

Conclusion

Nowadays, it is essential to protect the production of high-value horticulture crops. Technological developments have the enormous potential to increase production efficiency. Among its many benefits is its capacity to produce higher-quality, high-value crops under subpar or marginal circumstances. Nonetheless, a significant cause for concern is the need for highly qualified labour, the initial high cost of infrastructure, and inappropriate fertilizer use. These issues can be easily resolved by teaching producers how to apply pesticides correctly, as well as about the full package of practices that should be followed for safe production and high-quality products. Other solutions include technology transfer and additional research in this field.

References

1. Chadha (2019): Handbook of Horticulture, ICAR, 2, 122-137.
2. Nguyen, T.H.N., Borgemeister, C., Max, J., Poehling, H.M. (2009). Manipulation of ultraviolet light affects immigration behaviour of *Ceratothripoidesclaratris* (*Thysanoptera*: *Thripidae*). *J. Econ. Entomol*. 102(4): 1559-1566.
3. Trivedi, A.K. and Singh, V.K. (2015). Potential for improving quality production of temperate horticulture crops under protected cultivational national workshop cum seminar on emerging prospects of protected cultivation in horticultrural crops under changing climate. Precision farming development center. Lucknow.