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Protected Cultivation

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Protected cultivation refers to the practice of growing plants in a controlled environment to shield them from adverse weather conditions, pests, and diseases. The goal of this technique is to improve crop quality and production while also optimising growth conditions. The primary goal is to create a microclimate that allows for better control over temperature, humidity, light, and other environmental factors, fostering optimal conditions for plant growth.

The effective use of structures like greenhouses, polytunnels, and shade nets is one of controlled cultivation's primary components. These structures act as barriers, providing a shield against extreme weather elements like excessive rain, wind, hail, and temperature fluctuations. They also offer protection from pests and diseases, reducing the reliance on chemical inputs.

Some advantages of protected cultivation include:

- Extended Growing Seasons:** Protected cultivation allows for year-round cultivation, extending growing seasons beyond traditional outdoor periods.
- Increased Yield and Quality:** By maintaining optimal environmental conditions, crops are more likely to achieve higher yields and better quality. This is particularly important for high-value crops.
- Water and Resource Efficiency:** Controlled environments enable more efficient use of water and other resources, as they can be precisely regulated based on plant needs.
- Reduced Pest and Disease Pressure:** The protective structures act as a barrier against pests and diseases, reducing the need for pesticides and promoting healthier crops.
- Crop Diversification:** Protected cultivation allows for the cultivation of a wide variety of crops that may not be well-suited to the local climate. This can lead to increased agricultural diversity and economic opportunities.

Common crops grown using protected cultivation methods include vegetables, fruits, flowers, and ornamental plants. The structure and cultivation techniques used are determined by the crops' individual requirements as well as the local environmental conditions. In summary, protected cultivation is a modern agricultural practice that utilizes controlled environments to enhance crop productivity, improve quality, and mitigate the impact of adverse weather and pests.

India is famous for its agro-climatic region. Its ranges from extreme temperate to extreme tropical region between these sub-tropical parts exist in our country. I mean to say that we have all the types of climates. That result in free to grow all types of crops with suitable climatic condition. In terms of vegetables, we have a varied range of options that can be cultivated in a variety of climates, from extremely hot to extremely cold. Most of the farming takes place on the plains, but there is plenty of room for cultivation in the hills.

Why protected cultivation is necessary

Protected cultivation provided a new way to grow more crops on a restricted amount of land, since increased urbanisation, small land holdings, falling crop output and biodiversity, expanding population, and need for food, particularly vegetables, are all limits in agricultural production. It entails growing vegetables to maximise output in a controlled environment where temperature, humidity, light, soil, water, fertilisers, and other factors are managed even during the off season.

What is greenhouse

“A greenhouse is a covered structure which protects plants from wind, precipitation, excess solar radiation, temperature extremes and considerable for pests & diseases.”

Concept of greenhouse farming

Green house farming is a total concept of modifying the natural environment for optimum plant growth.

- It incorporates the manipulation of air and root zone temperatures, relative humidity, radiant energy (light), air velocity, atmospheric concentration of carbon dioxide, root zone oxygen concentration and nutrient and moisture supply to control crop growth.

Scope and importance of protected cultivation in India

- Agriculture is highly dependent on environment, and it is very difficult to get favourable climatic conditions for crop growth and development as per crop need.
- Agriculture is basically climate/season based, a hot and humid climatic condition characterized in rainy and post rainy season is most favourable for both crop and crop enemies.
- To raise a healthy disease-free crop, spring-summer seasons was counted as most suitable. Rapid climatic changes have altered the spring-summer season, leading to unexpected rains and other oscillations. This highlights the need for climate-resilient technology.
- Not even that, with time extreme, hot and cold temperature stresses have been noticed in geographically varied locations where it was not supposed to be earlier based on various geographical factors deciding the climatic conditions of that area.
- Therefore, there is need to develop suitable varieties and technologies to sustain these challenges which may come up in form of various biotic and abiotic factors.
- Vegetable cultivation is an awesome business in India, but under open field conditions by following traditional cultivation practices it is difficult to manage various abiotic and biotic stresses. These stressors not only diminish output but also lead to poor quality, especially during and after the wet season.
- Mostly to manage biotic stresses farmers spray large amount of different chemicals, this not only enhances the cost of cultivation but it also increases residual toxicity in the freshly produced vegetables, which is ultimately hazardous to human being.

Advantages

- Protection of plants from abiotic stress (physical or by non-living organism) such as temperature, excess/deficit water, hot and cold waves.
- Crops can be grown throughout the year in a particular area.
- Off-season nursery can be established, extending the harvesting season.
- It provides an excellent opportunity to produce high quality yield.
- Productivity and financial returns per unit area are higher.
- High quality seed production attributes can be undertaken.
- Greenhouses are great for farmers with modest properties.

- Insect pests and diseases can be controlled easily.
- Minimised agricultural inputs.
- Production of disease-free, higher-quality transplants.
- Propagation of planting material to improve germination percentage; healthy, uniform, disease free planting material and better hardening.

Limitations

- High cost of initial infrastructure (capital cost).
- Non-availability of skilled human power and their replacement locally.
- Insufficient technical expertise in cultivating crops within protected buildings.
- All the operations are very intensive and require constant effort.
- Need constant observation and supervision.
- A few pests and soil-borne pathogens are difficult to manage.
- Repair and maintenance are major hurdles.