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FACULTY OF AGRICULTURE SCIENCES AND ALLIED INDUSTRIES

Unit I

(Protected Cultivation)

For

B.Sc. Ag (Third Year)

Course Instructor

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Lecture No. 1 Protected cultivation- importance and scope, Status of protected cultivation in India and World types of protected structure based on site and climate

Introduction

Protected cultivation is a process of growing crops in a controlled environment. This means that the temperature, humidity, light and such other factors can be regulated as per requirement of the crop. This assists in a healthier and a larger produce. There are various types of protected cultivation practices. Some of the commonly used practices are — forced ventilated green house, naturally ventilated polyhouse, insect proof net house, shade net house, plastic tunnel and mulching, raised beds, trellising and drip irrigation. These practices can be used independently or in combination, to provide favourable environment to save plants from harsh climate and extend the duration of cultivation or off-season crop production. Adoption of drip irrigation under raised beds (you will read about it in Unit 4) covered with mulch films not only eradicates weeds but also maintains moisture in the soil for a prolonged period by minimising evaporation losses.

Importance of Protected Cultivation

Although agriculture has been the backbone of India's economy since ages, yet our experience during the last 50 years indicates a relationship between the agricultural practices, its growth vis-à-vis economic well-being. The trend of agricultural growth points towards a mix of appreciable achievements on the one hand and missed opportunities on the other. If India has to remain self-sufficient and provide food security to the poor while also being able to export high quality fruits and vegetables, new and effective production technologies are required which can continuously improve the productivity, profitability and respectability of the agricultural sector. One such area is the protected cultivation technology, which is being widely practiced in the developed countries, but its use in India is limited. The wide variations in the climatic conditions across the diverse topography through the length and breadth of the country allow a large number of cropping patterns.

India also experiences climatic extremes such as floods, droughts and other climatic abnormalities that cause crop losses regularly or damages resulting in economic losses to the farmers. Simultaneously, the demand for quality agricultural produce has increased over the last decade. This provides better opportunities for the Indian farmers to adopt protected cultivation technologies as per region and suitability of the crops. Greenhouses are being commercially used for production of exotic (non-native) and off-season vegetables, export-quality cut flowers and also for raising quality seedlings. Economic returns from the high value agricultural produce can be increased substantially when grown under greenhouse conditions. For the crops under protected environment, the use of chemical pesticides and insecticides can be kept minimal to avoid their residues on the crop produce.

Greenhouses are mostly used as rain shelters, particularly in high rainfall areas of India such as North-eastern states and coastal regions.

Objectives of Protected Cultivation

(i) Protection of plants from abiotic stress (physical or by non-living organism) such as temperature, excess/deficit water, hot and cold waves, and biotic factors such as pest and disease incidences, etc. Do you know? Greenhouse effect When short wave radiation from the Sun enters the greenhouse structure, it refracts through the surface and gets transformed into long wave radiations. These long wave radiations do not escape the greenhouse in entirety, thereby trapping the heat and thus, continually increase the temperature inside. This is known as the greenhouse effect. Thus, the enclosed space builds higher temperature than the ambient environment. However, after sunset it starts losing stored heat through conduction, convection and radiation. Chapter -1.indd 2 13-08-2018 12:18:46Introduction to Protected Cultivation 3

(ii) Efficient water use with minimum weed infestation.

(iii) Enhancing productivity per unit area.

(iv) Minimising the use of pesticides in crop production.

(v) Promotion of high value, quality horticultural produce.

(vi) Propagation of planting material to improve germination percentage; healthy, uniform, disease free planting material and better hardening.

(vii) Year-round and off-season production of flower, vegetable or fruit crops.

(viii) Production of disease-free and genetically better transplants.

At present in India, the small and medium farmers have started flower and vegetable cultivation under different types of modular protected structures depending upon their investment capacity and availability of market in their area. Among all the protected cultivation practices, greenhouse cultivation provides maximum benefits. The major crops grown under protected structures include — floriculture crops like rose, gerbera, carnation, anthurium, lilium, orchids, chrysanthemum, etc., and the vegetable crops like tomato, yellow and red bell peppers (from the capsicum family), cucumber, leafy and exotic vegetables, etc.

Limitations of Protected Cultivation

(i) High cost of initial infrastructure (capital cost).

(ii) Non-availability of skilled human power and their replacement locally.

(iii) Lack of technical knowledge of growing crops under protected structures.

(iv) All the operations are very intensive and require constant effort.

(v) Requires close supervision and monitoring.

(vi) A few pests and soil-borne pathogens are difficult to manage.

(vii) Repair and maintenance are major hurdles.
(viii) Requires assured marketing, since the investment of resources like time, effort and finances, is expected to be very high.

Scope of Protected Cultivation

As per the National Horticultural Database of the year 2014–15, Tamil Nadu ranks first in area under flower cultivation followed by Karnataka, and West Bengal. The share of floricultural products in the export of total horticultural produce is 3.2 per cent. At present the share of Indian floriculture products in international market is about 0.6 per cent. According to (APEDA) data, in the year 2016–17, India's total export of floriculture was Rs 548.74 crores. Dry flowers alone contribute around 70 per cent revenue of the total floricultural export. India has a share of 10 per cent of the total global dry flower market. There are over 300 export-oriented Floriculture Units in India, mostly located near Mumbai, Pune, Bengaluru, Hyderabad and New Delhi, which have good facility for expert of live plant material for producing and exporting flowers to the developed countries.

The export-quality flowers include bulbs, cut and loose flowers, dry flowers, ornamental plants and cut foliage, which are most suited for greenhouse cultivation. Besides this, greenhouse technology holds premise for marginal farmers for higher productivity and quality through high technology based agriculture. While greenhouses did exist in one form or the other for more than one-and-a-half centuries in various parts of the world, the use of greenhouse technology started in India only during 1980s mainly for research activities, after India had achieved self-sufficiency in foodgrain production. After the 'Green Revolution', some of the ill consequences like extensive use of chemicals in fertilisers and pesticides of intensive agriculture became evident. Besides the government's efforts, globalisation has given a boost to the export of agricultural produce, which has played a role in the increased demand for greenhouses in most parts of the country.

Commercial production of floriculture exists in Maharashtra, Tamil Nadu and Karnataka, which cater to the demands of both domestic and foreign markets. From 1988 onwards, these ventures have been specialised further to achieve a technological edge involving development of greenhouses.

These haveimproved further post-1991 India when Indian economy was liberalised. At present, the private sector has established 100 per cent export-oriented units. These efforts have been quite successful in meeting export standards for the regularity of supply, quality and hence acceptability in offshore markets. Exports have achieved very promising results in terms of the acceptance of quality standards in major foreign markets. Table 1.1:

Crops Grown under Protected Cultivation Flowers Chrysanthemum, Carnation, Gerbera, Rose, Lilium, Orchid, Gladiolus, etc. Vegetables Tomato, Coloured Capsicum (Yellow and Red Bell Peppers), Cucumber, Broccoli, Red Cabbage, Leafy vegetables, Radish, etc. Fruits Strawberry Seedling and

Nurseries Vegetables, Flowers, Tissue Culture, Clonal for Forestry, Fruit Grafting (like Lemon, Citrus, Mango, Pomegranate, Guava, Litchi, etc.)

The Government of India executes various schemes for protected cultivation at the central and the state levels to popularise these high-tech plant growing techniques. National agencies through their leading schemes viz. National Horticulture Board (NHB), National Horticulture Mission (NHM), Mission for Integrated Development of Horticulture (MIDH) and Rashtriya Krishi Vikas Yojana (RKVY) create awareness and provide financial support to the farmers, so that protected farming for high value horticultural crops could be adopted easily.

Protected cultivation involves a complex set of practices and technologies which require elaborate planning, fabrication, management and maintenance of quality production of horticultural crops to take advantage of season, demand and choice of market. It gives opportunities for the cultivation of horticultural crops in an entrepreneurial form for the up-markets in urban and semi-urban areas, besides empowering youth, and technology-led traditional ways of crop cultivation to such modern methods.