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HI-TECH AGRICULTURE- A BOON FOR INDIAN ECONOMY

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Horticulture has a crucial role in food and nutritional security. It is a crucial component of the stakeholder's economic security. Hi-tech horticulture is a modern, environmentally friendly, and capital-intensive technique that can boost productivity and profitability for farmers. In the new era of climate change, hitech horticulture has become a requirement for Indian farmers to maintain production and economic stability. Hi-tech horticulture is beneficial not only in the production of fruits, vegetables, and flowers, but also in conservation, plant protection, and post-harvest management, including value-adding. The current essay examines many facets of high-tech horticulture and speculates on future possibilities.

Hi-tech horticulture refers to the application of advanced technologies such as integrated pest management, integrated nutrient management, hybrid seeds, genetically modified planting materials, protected cultivation, plasticulture, micropropagation, microirrigation, fertigation, hydroponics, precision farming, high density planting, advance mechanisation, and others to the management and qualitative production of horticulture produce for a high economic return.

High-tech farming refers to agricultural enterprises that use cutting-edge technology. It is a capital-intensive agriculture since it necessitates a high capital outlay for the acquisition of specialised equipment, asset maintenance, labour training, and so on. Hi-tech agriculture mostly refers to a commercial farming system designed to meet the needs of both domestic and international markets. It makes use of farming technology to boost yields, ensure excellent quality (typically without pesticides), and raise market value.

Potential Areas of Hi- Tech Horticulture

1. Protected cultivation

Solar and photovoltaic systems are used in a greenhouse. Pumps, UV filters, and lighting may all be made more environmentally friendly and sustainable by utilising modern solar technology. They can also be supported and operated autonomously. The aquaponic solar greenhouse enables for the production of crops, fish, and solar energy all at the same time. As a result, the food produced has an extremely low or even negative CO₂ footprint (CO₂ sink).

2. Soil less agriculture

A vertical hydroponic farm that grows underground uses 70% less water than a traditional farming operation. It uses a closed-loop ebb and flow system, in which water with nutrients floods the sprout beds a few times a day, then is recycled and reused through a reservoir.

3. Hydroponics

The idea of hydroponics is to eliminate any potential barriers to optimal growth that may exist between the roots, water, nutrients, and oxygen. It is a method of growing plants that does not require the use of soil and instead relies on mineral fertiliser solutions in a water solvent.

4. Aeroponics

Aeroponics is the process of growing plants without the use of soil or aggregate medium in an air or mist environment.

5. Vertical farming

Vertical farming, which involves growing vegetables in temperature, moisture, and nutrition-controlled indoor conditions, can boost yield while limiting environmental externalities.

Hi-Tech in India

Horticulture is no longer just a way of diversification; it is now a key part of food and nutritional security, as well as an important component of economic security. Many states,

including Maharashtra, Karnataka, Andhra Pradesh, and Kerala, have benefited from the adoption of horticulture (Singh, 2014). According to the growing population, there is a significant strain on natural resources, which is compounded by global warming and climate change, shrinking land holdings, and a strong demand for high-quality horticulture fresh produce. Cryopreservation offers a lot of potential for horticulture plants, but it's not being used. Cryopreservation protocols for pollen and vegetatively generated explants of horticultural crops are being developed. (Benelli, 2013).

Hi-Tech Propagation

A reputable horticulture firm cannot thrive without the availability of high-quality planting material. Micro-propagation is a useful technique for rapidly growing a large number of plants. It has previously benefited banana (*Musa spp.*), bell pepper (*Capsicum annum*), tomato (*Solanum Lycopersicum*), chilli (*C. annum*), and other ornamental plants. Crop micropropagation, particularly ornamental crop micropropagation, has a lot of potential in India.

Plug-plant propagation is beneficial for producing healthy, virus-free seedlings that shorten the pre-bearing phase, ensure uniform crop growth, and make harvesting easier.

Grafting is a novel hi-tech approach for vegetable crops, particularly watermelon (*Citrullus lanatus*), capsicum, and brinjal. Vegetable grafts are grown on a big scale in states like Chhattisgarh.

Advantages

- Enhancement of yield by 5 to 8 times, high productivity per unit area
- Improved quality growth and uniformity
- Optimal applications of key inputs including water (up to 50 percent), fertilizers (up to 25 percent), and pesticides.
- Increase of probability of cultivation in problematic areas like undulating terrains, saline, and waterlogged areas.
- Availability of production during off-seasons
- Benefits can be obtained throughout the year
- Reduction of impacts in the natural ecosystem
- Reduction in runoff of chemicals into rivers and ground waters.

Future Prospects

Hi-tech horticulture is a potent instrument for doubling horticultural crop output, and it can also be used to double farmers' income (DFI). To stay up with modern information-based judgments, real-time data from the crops must be recorded and instantly disseminated to decision makers as a successful hi-tech horticulture enterprise. Sensor networks, cloud computing, augmented reality, unmanned air vehicles, and control area networks are some of the cutting-edge technologies that can be used in hi-tech horticulture (Ahrary and Ludena, 2015). The combination of such technologies with indigenous expertise will have far-reaching implications, ensuring that hi-tech agriculture achieves new heights.

Conclusion

Hi tech, horticulture provides the scope for cultivation of different exotic genotypes. This also promotes the cultivation under protected condition thereby allowing adaptations as well as hardening of planting materials to extreme environmental conditions. This also provides the farmers the supply of products during off season as well as throughout the year. Therefore, in this modern era, when most of the research are targeted towards development of climatic resilience, hi tech horticulture have a pioneering role in this regard. This technology has fortified the income of farming society to great extent.

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