

## Protected Cultivation and High-Tech Horticulture in Rajasthan State

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Rajasthan is well-known for its harsh climate, sandy soils, and scarce water supplies. Traditional farming methods and erratic rainfall have always been essential to the state's agriculture, especially in arid and semi-arid areas. Heat waves, temperature swings, and frequent droughts pose significant problems for farmers. Protected cultivation and high-tech horticulture have become creative and sustainable solutions in this context. These cutting-edge methods are revolutionizing horticulture in Rajasthan by raising farmers' incomes, guaranteeing high-quality produce, and boosting productivity.



### Meaning of Protected Cultivation

Growing crops in controlled environments using structures like polyhouses, greenhouses, shade net houses, and tunnels is known as protected cultivation. These buildings shield crops from inclement weather, such as intense heat, cold waves, strong winds, and pests. Protected buildings contribute to the creation of a microclimate that is ideal for crop growth in Rajasthan, where summer temperatures frequently surpass 45°C. Farmers can produce crops year-round with lower risk by managing temperature, humidity, light intensity, and irrigation.

### Concept of High-Tech Horticulture

To increase productivity and efficiency, high-tech horticulture combines cutting-edge technologies with protected structures. Drip irrigation, fertigation, soil moisture sensors, hybrid seeds, tissue culture plants, automated climate control systems, and occasionally hydroponic systems are all included. Water and nutrients are used precisely thanks to these technologies. Such resource-efficient systems are crucial for sustainable development in a state like Rajasthan that has limited water resources.

### Importance in Rajasthan

In Rajasthan, protected cultivation is especially crucial because it helps get around environmental and climatic constraints. In contrast to traditional open-field cultivation, which is extremely susceptible to weather extremes, controlled environment agriculture lessens this uncertainty. Even in off-season times when market prices are high, farmers can cultivate valuable flowers and vegetables. This boosts profitability in addition to ensuring steady production.

### Crops Can Be Grown

In Rajasthan, farmers primarily cultivate leafy vegetables, tomatoes, capsicums, cucumbers, and chillies under protected cultivation. Roses and gerberas are examples of floral crops that

are successfully grown. In urban markets, exotic vegetables like lettuce and cherry tomatoes are becoming more and more popular. When compared to conventional cereal crops, these crops yield higher returns.

### **Resources Efficiency and Water Management**

One of Rajasthan's biggest problems is water scarcity. Drip irrigation and fertigation, which conserve 40–60% of water when compared to traditional irrigation techniques, are encouraged by protected cultivation. By delivering nutrients straight to the root zone, waste is decreased and nutrient utilization efficiency is increased. This methodical approach to water management guarantees the sustainable use of finite resources.

### **Institutional Role and Government Support**

Through financial aid and subsidies under several horticulture programs, such as the Mission for Integrated Development of Horticulture (MIDH), the Government of Rajasthan actively encourages protected cultivation. Support is given to farmers so they can build polyhouses, set up drip irrigation, and buy new machinery. Organizations like the Central Institute for Arid Horticulture, which creates better technologies appropriate for arid areas, offer research and technical advice.

### **Economic and Social Impact**

Using high-tech growing methods has really boosted the income of farmers who use them. Many farmers are seeing their earnings jump by two to four times compared to traditional farming. Because the veggies are consistently top-notch, they get better prices at the market. Plus, this kind of farming creates jobs in the countryside, gets young people interested in agriculture, and gives women opportunities in nurseries and flower growing.

### **Challenges in Adoption**

Of course, there are some challenges. It costs more to get started, and you need to know your stuff. This can be tough for smaller farmers. To make it work, you really need good training, regular check-ins, and smart marketing. Also, prices can change, which can affect profits. That's why support from the government and agricultural experts is so important.

### **Future Aspects**

The future looks bright for this kind of farming in Rajasthan. More and more people in cities want good-quality vegetables, and we need farming that can handle changing weather and conserve water. All of this is helping the sector grow. Adding things like automation, solar power, and precision farming will make this kind of farming even stronger and more sustainable in the state.

### **Conclusion**

Protected cultivation and high-tech horticulture are really changing the game for farming in Rajasthan. They're great ways to handle tough issues like changing weather, not enough water, and low crop yields. If Rajasthan keeps up with smart innovations and backs them up with the right policies, it can really boost its horticulture and help farmers thrive for years to come.