



## Climate-Smart Practices for Fruit and Vegetable Cultivation

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### INTRODUCTION

India is one of the leading producers of fruits and vegetables, yet farmers face major challenges due to changing weather conditions. In recent years, higher temperatures, uneven rainfall, long dry periods and sudden storms have become more common. These conditions affect fruit set, growth, quality and overall yield. Fruits and vegetables are highly sensitive crops and spoil quickly if the weather is not favourable. Because of this, farmers need simple, affordable and climate-smart practices that help them protect their crops and maintain productivity even when the climate becomes unpredictable.

Climate-smart horticulture refers to a set of practices that help farmers use water more efficiently, improve soil health, adjust to changing temperatures, and reduce the risk of crop failure. These methods do not require very high investment and can be adopted easily in different regions. Many farmers who have used these practices have observed higher yields, better quality produce and reduced losses. The following sections describe some useful and practical climate-smart measures for fruit and vegetable cultivation that farmers can adopt for better results.

### Improving Soil and Moisture Conservation

Healthy soil is the first requirement for withstanding climate stress. When soil is rich in organic matter, it holds more water and provides a steady supply of nutrients to crops. Farmers can improve soil health by regularly adding farmyard manure, compost, vermicompost and crop residues. These materials increase the water-holding capacity of the soil, which is very important during dry periods. Green manuring with crops like sunhemp also enriches the soil and improves its structure.

Mulching is another very effective practice for fruit and vegetable crops. A layer of dry leaves, straw or plastic mulch around the plants helps reduce water loss from the soil. It keeps the soil temperature steady and prevents weed growth. In fruit crops like papaya, banana, pomegranate and guava, mulching helps maintain moisture during hot months. In vegetables such as tomato, chilli, brinjal and cucurbits, mulching protects the roots and improves overall plant health. Farmers who use mulching often need less irrigation and observe better fruit quality.

#### **Efficient Water Use through Drip Irrigation**

Water shortage is a major problem in many fruit and vegetable growing areas. Drip irrigation is one of the best climate-smart technologies to manage water efficiently. It delivers water directly to the root zone, reducing evaporation and wastage. Farmers can save 40–60% water compared to traditional irrigation methods. Drip irrigation is especially useful for crops like banana, citrus, papaya, pomegranate, tomato, capsicum and cucumber.

When fertilizers are given through drip irrigation (fertigation), plants receive nutrients in small but regular amounts. This helps improve growth, fruit size and overall yield. Since water and nutrients are applied in a controlled manner, the plants experience less stress. Drip irrigation also reduces the spread of soil-borne diseases and helps maintain uniform moisture levels. For farmers facing irregular rainfall, drip irrigation provides a reliable way to support crops during critical growth stages.

#### **Use of Shade Nets and Protected Structures**

Extreme heat and unexpected rainfalls often damage tender fruit and vegetable plants. A simple shade net or low-cost protective structure can help farmers regulate the temperature around the plants. Shade nets reduce heat stress and protect crops from scorching sunlight. They are especially helpful for raising healthy seedlings of vegetables and fruits, as young plants are very sensitive to weather changes.

Polyhouses and insect-proof net houses offer even better control over temperature, humidity and pests. Although these structures

require investment, small and low-cost models are now available for farmers. Under protected conditions, crops like tomato, capsicum, cucumber and strawberry grow with better quality and higher productivity. These structures also allow off-season cultivation, helping farmers earn better income. In fruit orchards, simple windbreaks and temporary shade structures protect young plants during extreme weather.

#### **Selecting Climate-Resilient Varieties**

Choosing the right variety is an important step in climate-smart cultivation. Many improved varieties of fruits and vegetables can tolerate high temperatures, drought, or excess moisture better than traditional ones. Heat-tolerant tomato and chilli hybrids, drought-tolerant cucurbits, and improved papaya, guava and pomegranate varieties have shown good results under changing weather conditions.

These varieties maintain flowering, fruit set and quality even when temperatures fluctuate. They also have better resistance to certain pests and diseases, which reduces the need for chemical sprays. Using region-specific and stress-tolerant varieties ensures more stable yields and reduces the risk of crop failure.

#### **Better Orchard and Field Management**

Proper management of fruit orchards and vegetable fields can reduce the impact of climate stress to a great extent. Pruning in fruit trees improves light penetration and air movement inside the canopy, which helps the plant handle heat more effectively. Regular pruning also reduces pest build-up. Painting the trunks of fruit trees with a lime solution protects them from sunburn during summer.

In vegetable crops, staking and trellising provide good support and reduce fruit damage during storms or heavy winds. Proper spacing between plants ensures good air movement, reducing disease incidence. Intercropping vegetables with fruit trees during early orchard years gives extra income and improves soil health.

Good pest and disease management is also important under changing climate conditions, as warmer temperatures increase pest

activity. Using traps, neem-based sprays and biological control agents reduces pest attack and keeps the produce safe.

### **Rainwater Harvesting and On-Farm Water Storage**

Since rainfall has become more unpredictable, storing water during the rainy season is a very useful practice. Small farm ponds, percolation pits and contour bunds help collect excess rainwater and store it for later use. This water can be used for drip irrigation during dry periods. In hilly areas or sloped land, contour farming reduces soil erosion and improves water infiltration. Farmers with polyhouses or sheds can also use roof-top rainwater harvesting systems.

These methods not only improve the availability of water but also increase groundwater recharge. With better water supply, farmers can keep their

crops safe during moisture stress and avoid major yield losses.

### **CONCLUSION**

Climate change has created new challenges for fruit and vegetable growers, but several simple and practical climate-smart practices can help reduce these risks. By improving soil health, saving water through drip irrigation, using mulching, selecting the right varieties, protecting crops with shade nets and structures, and harvesting rainwater, farmers can maintain better productivity even under difficult weather conditions. These practices require moderate investment but offer long-term benefits in terms of higher yield, improved quality and better resilience. With proper awareness and adoption, climate-smart horticulture can become an important tool for sustaining fruit and vegetable production across the country.