

Production Constraints in Mango Cultivation: Challenges from Orchard to Market

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Introduction:

Mango (*Mangifera indica* L.), popularly known as the "**King of Fruits**," is one of the most important tropical fruit crops cultivated across the world for its exceptional taste, nutritional value, and economic significance. India is the largest producer of mangoes, contributing nearly



half of the global production and cultivating the crop over diverse agro-climatic regions. The challenges affecting mango cultivation extend throughout the entire value chain from orchard establishment and crop management to harvesting, post-harvest handling, transportation, and marketing. In the orchard, farmers face constraints such as erratic weather, water scarcity, declining soil fertility, pest and disease incidence, physiological disorders, and inadequate adoption of improved production technologies. Addressing these production constraints through climate-resilient orchard management, efficient resource use, integrated pest and nutrient management, improved post-harvest infrastructure, and stronger market linkages is essential for enhancing mango productivity, fruit quality, and the sustainability of mango-based farming systems.

1. Climate: The Biggest Uncontrollable Factor

Weather plays a decisive role in mango production. Flowering and fruit development are highly sensitive to climatic conditions.

Major climatic constraints include:

- Erratic rainfall affecting flowering and fruit set.
- Unseasonal rain during flowering, leading to flower drop and fungal diseases.
- High temperatures causing fruit drop and sunburn.
- Drought reducing fruit size and yield.
- Cyclones and strong winds damaging branches and immature fruits.

Climate variability has made mango cultivation increasingly unpredictable, emphasizing the need for climate-smart orchard management.

2. Soil and Water Problems

Healthy soil is the foundation of productive orchards. However, many mango-growing areas suffer from poor soil fertility and inefficient water management.

Common problems include:

- Low organic matter.
- Nutrient deficiencies.
- Saline or alkaline soils.
- Poor drainage leading to waterlogging.
- Inadequate irrigation during flowering and fruit development.

Adoption of drip irrigation, mulching, and integrated nutrient management can substantially improve productivity.

3. Pest Attack: A Constant Threat

Several insect pests cause severe economic losses every year.

Important insect pests

- Mango hopper
- Fruit fly
- Mealy bug
- Stem borer
- Shoot borer
- Thrips
- Scale insects

Among these, the **fruit fly** is considered one of the most destructive pests because it directly damages marketable fruits.

4. Diseases Reduce Yield and Fruit Quality

Fungal and bacterial diseases become severe under humid conditions.

Major diseases include:

- Anthracnose

- Powdery mildew
- Bacterial canker
- Dieback
- Stem-end rot
- Sooty mould
- Red rust

Timely orchard sanitation, pruning, and integrated disease management are essential for reducing crop losses.

5. Physiological Disorders

Many production losses occur even in the absence of pests and diseases.

Important disorders are:

- Alternate (biennial) bearing
- Flower and fruit drop
- Mango malformation
- Spongy tissue
- Jelly seed
- Black tip
- Fruit cracking
- Sunburn

These disorders often result from nutritional imbalance, environmental stress, or genetic factors.

6. Poor Orchard Management

Several orchards continue to suffer from outdated production practices.

Major management constraints include:

- Old and unproductive trees.
- Lack of regular pruning.
- Overcrowded orchards.
- Poor canopy management.
- Low adoption of high-density planting.
- Limited use of improved cultivars.

Rejuvenation pruning and scientific canopy management can significantly increase productivity.

7. Post-Harvest Losses

Even after successful production, substantial quantities of mangoes are lost before reaching consumers.

Major post-harvest problems include:

- Mechanical damage during harvesting.
- Poor grading and packaging.
- Lack of cold storage.
- Transportation losses.
- Limited processing facilities.

Reducing post-harvest losses directly increases farmers' income without expanding cultivated area.

8. Marketing Challenges

Farmers frequently encounter:

- Price fluctuations during peak harvest.
- Dependence on middlemen.
- Limited export opportunities.
- Lack of market information.
- Inadequate value-addition facilities.

Better market linkages and farmer producer organizations can improve returns.

9. Climate Change: An Emerging Challenge

Climate change is intensifying many existing problems.

Its effects include:

- Irregular flowering.
- Increased pest and disease incidence.
- More frequent droughts and heat waves.
- Uncertain yields.
- Reduced fruit quality.

Climate-resilient varieties and precision orchard management will become increasingly important in the coming years.

10. Rainfed mango cultivation challenges:

It plays a vital role in the livelihoods of millions of farmers in semi-arid and tropical regions of India. However, productivity is often constrained by heavy dependence on monsoon rainfall and limited access to irrigation. Erratic rainfall, prolonged dry spells, high temperatures, and recurrent droughts frequently result in poor flowering, reduced fruit set, excessive flower and fruit drop, and lower fruit quality. These climatic stresses are compounded by low soil fertility, poor soil moisture retention, nutrient deficiencies, and inadequate organic matter, which restrict tree growth and reduce yield potential. In addition, alternate bearing, physiological disorders, and damage from pests such as mango hopper, fruit

fly, and mealy bug, along with diseases like anthracnose and powdery mildew, further diminish productivity under rainfed conditions.

Socio-economic and management-related constraints also limit the performance of rainfed mango orchards. Many orchards are old and poorly maintained, with limited adoption of scientific practices such as canopy management, pruning, balanced nutrient application, mulching, rainwater harvesting, and integrated pest management. Small and marginal farmers often face shortages of quality planting material, inadequate technical guidance, labour scarcity, and limited access to credit and markets. Climate change has further intensified these challenges by increasing the frequency of droughts, heat waves, and unseasonal rainfall. Improving the productivity and sustainability of rainfed mango cultivation therefore requires an integrated approach that combines soil and water conservation, climate-resilient orchard management, efficient nutrient and pest management, and enhanced extension support to strengthen farmers' resilience and income.

Practical Solutions for Sustainable Mango Production

To overcome these constraints, farmers can adopt the following measures:

- Plant certified, disease-free grafts of improved varieties.
- Follow balanced fertilization based on soil and leaf analysis.
- Use drip irrigation and mulching to conserve water.
- Adopt integrated pest and disease management (IPM).
- Regularly prune trees to improve light penetration and air circulation.
- Rejuvenate old orchards through scientific pruning.
- Improve harvesting, grading, packaging, and cold-chain facilities.
- Promote processing and value addition.
- Strengthen farmer training and access to market information.

Conclusion

Mango cultivation remains one of the most profitable horticultural enterprises, but its full potential can only be realized by addressing production constraints from the orchard to the marketplace. Scientific orchard management, climate-resilient technologies, efficient pest and disease control, improved post-harvest handling, and stronger market linkages will ensure higher productivity, better fruit quality, and increased income for mango growers. With continued innovation and sustainable practices, the "King of Fruits" can continue to thrive in the face of changing environmental and economic conditions.

**“Grow mango trees, grow a greener tomorrow;
Harvest sweet fruits, harvest a better future.”**