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# High-Density Mango Plantation for Maximum Yield

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Mango (*Mangifera indica* L.) is India's national fruit but traditional orchards have low productivity 6-8 ton/ha due to wide spacing and tall trees. High-Density Plantation HDP uses closer spacing, dwarfing rootstocks, and canopy management to accommodate 400-2500 plants/ha. HDP increases yield to 25-35 ton/ha within 4-5 years, enables early bearing, and reduces labor cost. This article discusses principles, varieties, management, and economics of HDP mango for regions like Udaipur, Rajasthan and Maharashtra.

## Introduction

Traditional mango orchards use 10x10m spacing with 100 plants/ha. Trees become 12-15m tall, making harvesting and spraying difficult. With land cost and labor shortage increasing, farmers need per-unit area productivity. HDP technology developed by CISH Lucknow and adopted under MIDH allows 3-4 times more trees per acre without yield loss. It shifts mango farming from extensive to intensive production.

## Concept of High-Density Plantation

HDP is based on 3 principles:

1. Close spacing : 2.5x2.5m to 5x5m vs 10x10m traditional. Plant population 400 to 2500 plants/ha.
2. Canopy control : Regular pruning, training, and PGRs keep tree height 3-4m for mechanization.
3. Early bearing : Dwarfing rootstocks + proper management induce flowering from 2nd year.

- Classification : High density 400-600 plants/ha, Ultra-high density 800-1600 plants/ha, Super-high density >2000 plants/ha.

## Selection of Variety & Rootstock

Varieties : Choose regular bearing, compact canopy, high yield varieties. Best for HDP: Amrapali, Mallika, Arka Arjun, Arka Anmol, Kesar, Dashehari. Amrapali is dwarf and most successful, yields 12-15 kg/plant at 5x5m spacing.

Rootstock : Use dwarfing rootstocks like Vellaikolamban, Kurukkan, Olour. They reduce tree vigor by 30-40% and induce early flowering. Avoid vigorous rootstocks like Kensington in HDP.

## Land Preparation & Planting System

Land prep : Deep ploughing, leveling. Avoid waterlogging as mango is sensitive. In Udaipur's slopy land, make contour trenches.

Spacing : Recommended 5x5m = 400 plants/ha for Amrapali. Ultra-high 2.5x2.5m = 1600 plants/ha needs more pruning. North-South row orientation for light penetration.

Pit size : 1x1x1m pit filled with 20kg FYM + 500g neem cake + 250g SSP + 100g MOP per pit. Plant during July-Aug monsoon.

Irrigation : Drip irrigation mandatory. 2-4 emitters per plant, 8-12 L/plant/day. Mulching with black polythene conserves moisture.

## Canopy Management Techniques

Training : Single leader system for first 3 years. Remove low branches below 75cm to allow air circulation.

Pruning : Annual pruning after harvest. Remove criss-cross, diseased, and water shoots. Keep canopy open for light.

Growth retardants : Paclobutrazol PBZ 2-4g a.i./plant soil drench in Sept-Oct induces flowering and controls vigor. Use only after soil test.

Dehorning/Rejuvenation : In old orchards converted to HDP, severe pruning of 50% canopy done in May-June, followed by PBZ for new flush.

## Nutrient & Water Management

Nutrient : HDP trees need more nutrients per ha. Annual dose for bearing Amrapali: N 600g, $P_2O_5$ 300g, $K_2O$ 500g per plant. Split into 3 doses: post-harvest, pre-flowering, fruit set. Fertigation improves efficiency by 40%.

Micronutrients : Foliar spray of Zn 0.5%, B 0.2%, Fe 0.2% at flowering and pea stage to prevent fruit drop.

Water : Critical stages are flowering, fruit set, and fruit development. Avoid irrigation during full bloom to reduce malformation. Mulch + drip saves 40% water.

## Pests, Diseases & Physiological Disorders

Major pests : Mango hopper, fruit fly, mealybug. Higher density needs prophylactic spraying due to dense canopy. Use yellow sticky traps + need-based insecticides.

Diseases : Powdery mildew and anthracnose spread fast in dense canopy. Spray wettable sulfur 0.2% and Carbendazim 0.1% alternately.

Disorders : Fruit drop and spongy tissue reduced in HDP due to better light penetration. Malformation controlled by PBZ and pruning.

## Advantages & Challenges

Advantages : 1. Yield 25-35 ton/ha from 5th year vs 8-10 ton/ha traditional. 2. Early income from 3rd year. 3. Easy spraying, harvesting due to dwarf trees. 4. Better fruit quality and color due to light penetration.

Challenges : 1. High initial cost ₹3-4 lakh/ha. 2. Skilled pruning and PBZ management needed. 3. Continuous nutrient + water supply required. 4. Risk of disease spread if humidity is high.

## Economics

Cost : Planting material ₹60/plant grafted, drip ₹1.2 lakh/ha, pit + labor ₹80,000/ha. Total establishment ₹3.5-4.5 lakh/ha. Subsidy 50% under MIDH for drip + planting.

Returns : At 5x5m, 400 plants/ha. Yield 30 kg/plant from 5th year = 12 ton/ha. @ ₹40/kg farm gate = ₹4.8 lakh/ha gross. Net profit ₹2.5-3 lakh/ha from 5th year.

B:C ratio : 2.8-3.5 over 10 years. Payback in 4-5 years.

## Conclusion

High-density mango plantation is a yield-oriented technology for modern mango growers. By combining dwarf varieties, dwarfing rootstocks, and scientific canopy + nutrient management, farmers can get 3-4 times higher yield from same land. For water-scarce areas like Rajasthan, coupling HDP with drip fertigation makes mango cultivation sustainable and profitable. Success depends on timely pruning, PBZ application, and marketing linkages for early produce.