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AGRICULTURE FORUM FOR TECHNICAL EDUCATION OF FARMING SOCIETY

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Smart Mango Farming for Higher Yield and Quality

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INTRODUCTION

Cultivating high-quality mangoes with consistently superior yields isn't just about luck or waiting for nature to take its course. It is an art backed by precise agricultural science. To transition from a standard harvest to a premium, high-yielding crop, a grower must orchestrate a delicate balance of factors: selecting the right climate-adapted varieties, implementing strategic canopy management, optimizing soil nutrition, and mastering the critical periods of irrigation and pest control. By focusing on targeted cultivation techniques, one can drastically minimize fruit drop, maximize sweetness and size, and ensure your trees deliver a bountiful, highly profitable harvest season after season.

The primary bottlenecks in mango productivity are biennial bearing, poor sex ratios (low proportion of hermaphrodite flowers), and dense, unproductive canopies that restrict light penetration and climate change effect.

1) **Varietal selection:** Select market oriented and improved, regular-bearing varieties such as Mallika, Sonpari, Imam Pasand, Kesar, Alphonso and improved hybrids like Ratna, Arka Suprabhath, and Arka Udaya etc.

Mallika Sonpari Imam Pasand Ratna Arka Suprabhath Arka Udaya

2) **Use of Standardizing Rootstocks for Vigour Control.** For example, grafting combinations like Amrapali/Olour or Mallika/Olour are being analyzed for their ability to maintain favorable stomatal conductance and controlled canopy architecture.

3) **Plant density and Canopy management:**
   - Adopt ultra-high-density planting (3 m × 2 m or 4 m × 2 m) with low-stature trees (2.5–3 m) for uniform light to bearing terminals.
   - Primary (Year 1): Cut the graft head at 60–70 cm to induce lateral buds. Select 3–4 strong, evenly spaced primary scaffolds with crotch angles >45°.
   - Secondary/Tertiary (Year 2): Head primaries to 40–50 cm to induce secondary branches; repeat to form well-spaced tertiary shoots for fruiting.

4) **Following structural pruning:**
   - **Shoot-tip pruning (tipping):** Remove the terminal 5–10 cm of current-season flushes to synchronize lateral growth.
   - **Height and lateral containment:** Shorten tall vertical terminals to outward-facing laterals; skirt lower branches to 50 cm above ground to prevent fruit–soil contact and improve airflow.
   - **Center opening**: Remove thick, upright, non-productive branches from the canopy center to form an open bowl (V) and allow light into the tree core.

5) **Flowering Regulation and Pollination:**
   - Apply PBZ 60–90 days before FBD (Aug–Sep) at 0.5–1.0 g a.i. per m canopy diameter. Place in a 10–15 cm deep trench at the inner

drip line (or 1 m from the collar), dissolving the dose in 10–12 L water per tree.

- A 1–2% potassium nitrate (KNO_3) foliar spray during bud differentiation can promote synchronous flowering, and is especially useful for cultivars with erratic bloom.
- Spray NAA 20 ppm at bud-burst (2 g a.i. dissolved in alcohol and diluted to 100 L water) to increase hermaphrodite flower differentiation and potential fruit set.
- Spray fresh cow-dung slurry (2–3%) or a sugar-based attractant on non-bearing border zones to lure dipteran pollinators into the orchard during cold or overcast mornings.

6) Fertilizer and Water Application:

Recommended dose of fertilizer:

Tree Age	**Nitrogen (N)**	**Phosphorus (P2O5)**	**Potassium (K)**
1st Year	100 g	50 g	100 g
2nd Year	200 g	100 g	200 g
3rd Year	300 g	150 g	300 g
Annual Increase (Years 4–9)	+100 g	+50 g	+100 g
10th Year onwards (Mature)	1000 g (1 kg)	500 g (0.5 kg)	1000 g (1 kg)

- Apply 40% of the annual N and P_2O_5 and 20% of the K_2O immediately after harvest. Maintain soil moisture at 70–80% of field capacity to support cell division in new flushes.
- Pre-flowering/FBD: stop N application and withhold irrigation for 60–75 days before flowering.
- Apply 30% of the annual N and P, and 40% of K via fertigation from pea to marble fruit stages. Foliar-spray twice (full bloom and pea stage) with Solubor 0.1% (B) + $ZnSO_4$ 0.5%. Boron improves pollen-tube germination/elongation; zinc regulates auxin synthesis and reduces early fruit drop.
- Apply the remaining 30% of P and 40% of K during fruit development and maturity. Withhold N for the final 30 days before harvest to prevent flesh softening and uneven ripening. Provide uniform daily drip irrigation based on crop evapotranspiration (ET_c). Avoid sudden soil-moisture fluctuations (e.g., heavy irrigation after a dry spell) to prevent internal turgor shifts and fruit cracking
- Spray 0.5% Arka Mango Special micronutrient twice before flowering and twice during fruit development.

7) Fruit drop management:

- Spray NAA 20 ppm immediately after fruit set to counter localized ethylene and reduce abscission.
- Apply GA_3 25 ppm at mid-development (marble stage) to promote cell elongation and strengthen fruit attachment.

8) Biotic stress regulation:

- For Mango hopper, take first spray at panicle emergence: Imidacloprid 17.8% SL (0.3 mL/L) or Thiamethoxam 25% WG (0.2 g/L) to target overwintering adults on trunks. If needed, apply a second pre-bloom spray of Azadirachtin (neem oil 10,000 ppm, 2 mL/L) or Metarhizium anisopliae (5 g/L). Do not apply chemical sprays during full bloom to protect pollinators.
- For powdery mildew, apply Wettable Sulfur 80% WP (2 g/L) at the first sign of white mycelial growth. If powdery mildew appears during full bloom, use systemic triazole fungicides such as Hexaconazole 5% EC (1 mL/L) or Myclobutanil 10% WP (0.4 g/L) to control the infection while minimizing damage to delicate floral parts.
- For anthracnose, apply protective sprays of copper oxychloride 50% WP (3 g/L) or Carbendazim 50% WP (1 g/L) monthly, especially after unseasonal summer rains, and maintain strict orchard sanitation by pruning and burning all infected twigs after harvest.

- Wrap a 30 cm-wide, 400-gauge alkathene sheet around the trunk at 45–60 cm above ground and secure with twine; smear grease or sticky paste along the upper edge and install by the first week of December. For source control, deep-plough basins in June–July to expose egg masses, and in November rake basin soil and apply Malathion 5% dust at 250 g per tree. If mealybugs reach panicles, spray while nymphs are small with Imidacloprid 17.8% SL (0.3 mL/L) or Dimethoate 30% EC

(2.0 mL/L) plus a silicon wetting agent/sticker (0.5 mL/L).

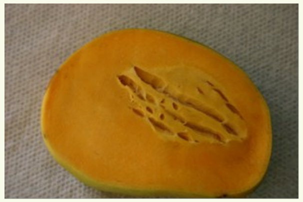
- For fruit fly: use methyl eugenol traps (methyl eugenol + malathion/dichlorvos), ~10 traps/ha, hung at eye level from canopy starting 45 days before harvest (hard-green stage). Collect fallen or damaged fruit every 2–3 days and destroy by burying ≥60 cm or sealing in thick black plastic for solarization. For export, apply Vapor Heat Treatment at 48°C for 20 minutes.


Powdery Mildew


Anthracnose


Fruit Fly

9) Abiotic stress (Heat stress):


Spongy Tissue


Sun Scald

- Foliar 6% kaolin reflects UV/IR, lowers leaf temperature, and preserves photosynthetic pigments. Potassium silicate and biostimulants stabilize antioxidants and growth hormones (IAA, GA) under severe stress.
- Brown or white paper bags stabilize fruit microclimate. Bagging 35–45 days after fruit set delays maturity, raises ascorbic acid, and can cut pest losses (specially fruit fly) by ~60%.
- harvest at 75–80% physiological maturity.

CONCLUSION

By manipulating canopy geometry, balancing cellular nutrition, and utilizing targeted biochemical regulations, growers can successfully overcome historical physiological barriers such as erratic vegetative flushing and premature fruit abscission.

Ultimately, mitigating biotic and environmental stressors through proactive, integrated management protocols safeguards the metabolic efficiency of the orchard. Implementing these advanced, scientifically validated methodologies stabilizes annual production cycles and maximizes physical fruit quality. This systematic approach ensures long-term orchard sustainability and high-value returns within competitive agricultural markets.