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Integrated Nutrient Management in Guava: A Complete Guide for Sustainable and Quality Production

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Guava (*Psidium guajava L.*) is one of the fastest-growing fruit crops in India. Its ability to adapt to various soils, produce multiple flushes, and yield throughout the year makes it a favourite among farmers. However, modern guava cultivation—especially high-density and commercial orchards—demands precise and sustainable nutrient management. Integrated Nutrient Management (INM) combines organic, inorganic, and biological sources to achieve optimal plant nutrition while protecting soil health. For guava growers, INM is the key to producing high-quality fruits at low cost with long-term sustainability.

Understanding Nutrient Demand in Guava

Guava is a **heavy feeder**. The plant produces:

- 2–3 growth flushes
- 2 flowering seasons (main & winter crop)
- Large number of fruits
- Vigorous root activity all year

Because of this, guava continuously removes large amounts of nutrients from soil.

Nutrient Removal by Guava (per ton of fruit)

- **Nitrogen (N):** 7–8 kg
- **Phosphorus (P_2O_5):** 2–3 kg
- **Potassium (K_2O):** 8–10 kg
- **Calcium:** 4–5 kg
- **Magnesium:** 2–3 kg
- **Micronutrients:** Zn, Fe, B in trace amounts

This explains why **guava orchards deteriorate in 4–6 years if nutrients are not replenished**.

Types of Nutrient Sources Used in INM

INM is successful only when all nutrient sources work **together**.

1. Organic Sources

- FYM
- Compost
- Vermicompost
- Green manures (sunhemp, cowpea)
- Poultry manure
- Fruit waste compost

- Leaf litter compost

How Organic Sources Help:

- Improve soil carbon
- Maintain soil pH
- Enhance microbial activity
- Improve water-holding capacity
- Release nutrients slowly

2. Chemical Fertilizers

These give **quick, targeted, and precise nutrients**.

Common chemical fertilizers used:

- Urea (46% N)
- DAP (46% P_2O_5)
- MOP (60% K_2O)
- SSP (16% P_2O_5 + S)
- NPK complexes (15:15:15 / 19:19:19)
- Micronutrient mixtures

3. Biofertilizers

These increase nutrient availability naturally:

- **Azotobacter:** fixes nitrogen
- **PSB:** dissolves unavailable phosphorus
- **KMB:** mobilizes potassium
- **Mycorrhiza:** boosts P and moisture absorption
- **Trichoderma:** improves root health

4. Orchard Floor & Soil Moisture Management

- Mulching
- Cover cropping
- Drip irrigation
- Basin management
- Contour planting (for slopes)

All these directly enhance nutrient availability.

Highly Detailed INM Schedule for Guava

A. Organic Manure Application (per mature tree/year)

Source	Quantity	Benefit
FYM	25–30 kg	Improves soil structure
Compost	10–15 kg	Enhances microbial life
Vermicompost	5–10 kg	Quick nutrient release
Neem cake	1–2 kg	Controls nematodes
Green leaf manure	5 kg	Adds organic carbon

Timing:

✔ **May–June** (before monsoon)

✔ Mixed thoroughly in root zone

B. Chemical Fertilizer Recommendation

Nutrient	Dose per mature tree
N	300–450 g
P_2O_5	200–300 g
K_2O	300–450 g

Split Application:

- **50%** in **June–July**
- **50%** in **October**

Why split?

Guava absorbs nutrients best when soil moisture is high.

C. Micronutrient Management

Guava commonly shows micronutrient deficiencies because of:

- Alkaline soil
- Continuous cultivation
- Flood irrigation
- Low organic matter

Soil Application

- $ZnSO_4$: 25–40 g/tree
- Borax: 15–20 g/tree
- $FeSO_4$: 25 g/tree
- $MgSO_4$: 30 g/tree

Foliar Sprays (very effective)

1. **Before flowering:** $ZnSO_4$ 0.5% + Boric acid 0.2%
2. **Fruit development:** $MgSO_4$ 1% + $FeSO_4$ 0.5%
3. **Winter crop:** Boron spray to reduce fruit cracking

D. Biofertilizer Application (Complete Details)

1. Azotobacter

- Fixes atmospheric N
- Enhances root biomass
- **Dose:** 20–25 g/tree

2. PSB (Phosphate Solubilizing Bacteria)

- Converts fixed P into available form
- **Dose:** 20–25 g/tree

3. Mycorrhiza

- Creates fungal network in soil
- Increases effective root area
- Reduces irrigation by 20–30%
- **Dose:** 100–200 g/tree

Method: Mix with compost and apply in basin.

Seasonal Nutrient Requirement Pattern in Guava

1. Vegetative Growth (April–June)

Needs high nitrogen.

Recommended: Vermicompost + Azotobacter

2. Flower Initiation (July–August)

Requires light nitrogen + more phosphorus.

3. Fruit Development (August–October)

Requires high potassium for fruit size and sweetness.

K is the "quality element" for guava.

4. Winter Crop Maturity (November–January)

Needs balanced NPK + micronutrients.

5. Post-Harvest Recovery (February–March)

Add organic manure + irrigation + mulching.

INM in High-Density Guava Orchards (HDPS/Ultra HDPS)

Spacing:

- 3 × 3 m (HD)
- 2 × 1 m (UHDP)

Nutrient demand is higher due to close spacing.

Recommended Approach:

- **Drip + fertigation** mandatory
- **Monthly feeding** of nutrients
- **Pruning + nutrient pulses** needed
- Avoid excessive nitrogen → vegetative growth increases

Fertigation Schedule:
- 4–6 kg NPK per acre per month
- 12–14 fertigation cycles a year
- Water-soluble fertilizers preferred

Soil Management for Effective INM

1. Soil Testing

Done every 2–3 years.

2. Basin Management
- Circular basin around tree
- 60–75 cm radius
- Prevents nutrient wastage

3. Mulching

Guava responds exceptionally well to mulching.

Benefits:
- Reduces moisture loss
- Adds organic matter
- Controls weeds
- Reduces soil temperature

Guava Nutrient Deficiency Symptoms (For Farmer Diagnosis)

Nitrogen Deficiency
- Pale green leaves
- Reduced growth
- Small fruits

Phosphorus Deficiency
- Purplish leaves
- Weak roots

Potassium Deficiency
- Leaf scorching
- Poor fruit size
- Low sweetness

Zinc Deficiency
- Small leaves
- Rosette appearance
- Low fruit set

Iron Deficiency
- Yellow young leaves

Boron Deficiency
- Fruit cracking

These symptoms disappear when proper INM is followed.

Climate-Smart INM in Guava

With climate change, guava orchards face:
- Erratic rainfall
- Heatwaves
- Flooding
- Nutrient leaching

INM helps through:

1. Carbon-rich soils → higher resilience
2. Mycorrhiza → drought tolerance
3. Mulching → temperature regulation
4. Drip fertigation → reduced water requirement

Long-Term INM Strategy for 10–15 Years

Every 3 years:

- Add 50 kg FYM per tree
- Add 1 kg micronutrient mixture
- Add 1 kg dolomite in acidic soils
- Apply Mycorrhiza (200 g/tree)

Every year:

- Add 5–10 kg compost
- Maintain mulching
- Split NPK schedule
- Maintain clean basins

This ensures sustained productivity for decades.

Conclusion

Integrated Nutrient Management is the **heart of sustainable guava farming**. By blending organic inputs, chemical fertilizers, biofertilizers, mulching, green manuring, and moisture management, INM:

- Enhances fruit quality
- Improves soil health
- Increases yield by 30–50%
- Reduces cost of cultivation
- Increases climate resilience
- Prolongs orchard life

For farmers, **INM is not an option—it is a necessity** to achieve profitable and sustainable guava production in modern agriculture.