

Macronutrient Correction Table

Nutrient	Common Source	Soil Dose (per L media or bed volume)	Foliar Spray	Key Notes
Nitrogen (N)	Urea	0.5–1.0 g/L	2% urea	Leaches easily; apply in cool hours
Phosphorus (P)	DAP / SSP	1–1.5 g/L	Not recommended	Soil fixation is common; apply with organic matter
Potassium (K)	KNO ₃ / MOP	1 g/L	1%	Useful during drought or transplant stress
Calcium (Ca)	Ca(NO ₃) ₂ / Gypsum	1–2 g/L	0.5%	Essential for root and shoot tips
Magnesium (Mg)	MgSO ₄	1 g/L	0.5%	Corrects interveinal chlorosis
Sulfur (S)	Ammonium Sulfate	1–2 g/L	0.5%	Needed for amino acid and protein synthesis

Micronutrient Correction Table

Nutrient	Preferred Form (for pH > 7.5)	Foliar Spray	Cautions & Tips
Iron (Fe)	Fe-EDTA / Fe-EDDHA	0.5%	Chelates essential at high pH
Zinc (Zn)	Zn-EDTA	0.5%	Soil application ineffective in alkaline soils
Manganese (Mn)	Mn-EDTA	0.5%	Chelated forms more effective in alkaline media
Copper (Cu)	Cu-EDTA	0.1–0.2%	Highly toxic in excess—use only if deficiency confirmed
Boron (B)	Borax / Solubor	0.1%	Very narrow safety margin – measure carefully
Molybdenum (Mo)	Sodium molybdate	0.05%	Critical for legumes like <i>Acacia</i> , <i>Dalbergia</i>

Forestry Nursery–Specific Best Practices

Nursery Type	Common Risks	Nutrient Management Strategy
Polybags	Nutrient leaching, root binding	Mix compost; use slow-release nitrogen (e.g., urea-DAP blend)
Root Trainers	Low volume, fast drying	Apply low-dose foliar nutrients regularly (every 10–15 days)
Raised Sand Beds	Nutrient drainage, poor micronutrient retention	Enrich with compost and periodic micronutrient sprays

Media Mixing & pH Optimization

- ✦ Use media mix: Loam : Sand : Compost = 1:1:1
- ✦ Target pH between 6.0 and 7.5 for balanced nutrient availability
- ✦ Add biofertilizers (e.g., Azospirillum, PSB) for N & P mobilization
- ✦ Avoid mixing lime and phosphate fertilizers in the same dose (precipitation risk)

Monitoring & Testing for Better Nutrition

- ✦ Test media and irrigation water for pH, EC, and key micronutrients every 3–6 months
- ✦ Use tissue analysis (leaf sampling) for confirming hidden micronutrient deficiencies
- ✦ Keep records of all fertilizer applications and plant responses

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Diagnosing & Correcting Nutrient Deficiencies in Nursery



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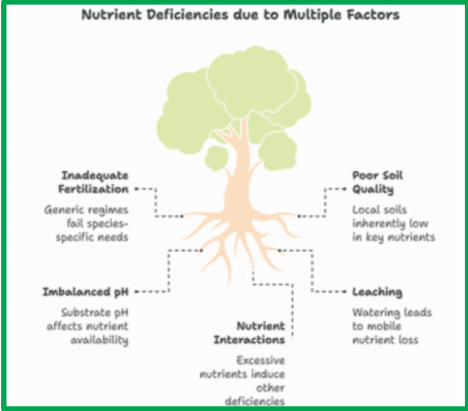
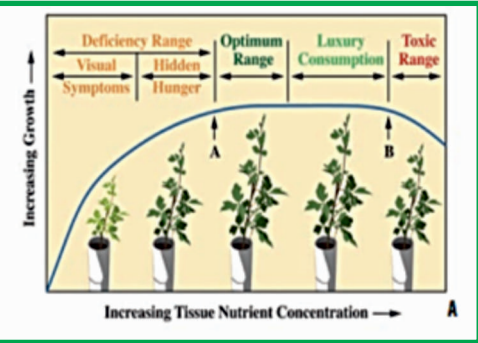
Nutrient Management in Nurseries

- Healthy seedlings are the foundation of resilient forest plantations.
- Seedlings quickly deplete nutrient reserves from seeds or cuttings and depend entirely on external sources for mineral nutrition. Adequate and balanced nutrient supply is essential for critical physiological functions such as photosynthesis, root initiation, and shoot elongation
- In nursery conditions, especially in confined containers like polybags and root trainers, seedlings are prone to nutrient imbalances due to limited soil volume, frequent watering, and variations in growing media.
- Micronutrient deficiencies, particularly iron (Fe), zinc (Zn), and boron (B) are common in alkaline soils or substrates with low organic matter. However, nutrient deficiency symptoms can resemble those caused by water stress, root binding, poor drainage, or pest damage.
- Misdiagnosis can lead to over-application of certain nutrients like boron or copper, which are toxic in excess and have narrow safety margins.
- Proper nutrient management can significantly accelerate growth often three to five times faster than unfertilized plants while enhancing root development and overall seedling quality.

Why This Matters

In forestry nurseries, undiagnosed nutrient deficiencies commonly result in:

- Stunted or chlorotic seedlings
- Poor root development
- Weak field performance
- Low transplant survival



Role of Nutrients in Forestry Nurseries (Polybags, Root Trainers)

Macronutrients (Needed in Larger Quantities)

Nutrient	Function in Plants	Role in Nursery Stage
Nitrogen (N)	Leaf and shoot growth; protein and chlorophyll synthesis	Supports early vegetative growth; pale lower leaves signal deficiency.
Phosphorus (P)	Energy transfer, root development, cell division	Promotes root hair formation, crucial in root trainer systems.

Nutrient	Function in Plants	Role in Nursery Stage
Potassium (K)	Water regulation, stomatal control, enzyme activation	Improves drought resistance and turgor in confined containers.
Calcium (Ca)	Cell wall and membrane structure; meristem activity	Supports root and shoot tip growth; prevents dieback.
Magnesium (Mg)	Chlorophyll component, photosynthesis activation	Prevents interveinal chlorosis and improves energy efficiency.
Sulfur (S)	Protein and enzyme formation	Promotes strong stems and nodulation in nitrogen-fixing seedlings.

Micronutrients (Required in Smaller Quantities)

Nutrient	Function in Plants	Role in Nursery Stage
Iron (Fe)	Chlorophyll synthesis, respiration	Corrects yellowing in young leaves, especially in alkaline media.
Zinc (Zn)	Enzyme activation, hormone synthesis	Essential for stem elongation; deficiency causes rosetting.
Boron (B)	Cell wall synthesis, sugar movement	Aids root tips and shoot growth; deficiency causes brittleness.
Manganese (Mn)	Photosynthesis enzyme activator	Prevents interveinal chlorosis, often confused with Fe deficiency.
Copper (Cu)	Lignin formation, reproductive growth	Supports healthy shoots; toxic if over-applied.
Molybdenum (Mo)	Nitrogen fixation and metabolism	Critical for legumes; deficiency stunts nitrogen-fixing seedlings.
Chlorine (Cl)	Osmotic regulation, photosynthesis	Rarely deficient; important for leaf hydration and turgor.

Quick Decision Guide for Diagnosing Nutrient Deficiencies

Step 1: Which Leaves Are Affected First?

Nutrient mobility influences where deficiency symptoms appear:

Affected Leaves	Mobility	Likely Nutrients	Common Symptoms
Older leaves first	Mobile	Nitrogen (N), Phosphorus (P), Potassium (K), Magnesium (Mg)	Yellowing (N, Mg), purpling (P), leaf scorch (K), marginal yellowing (Mg)
Younger leaves first	Immobile	Iron (Fe), Zinc (Zn), Boron (B), Calcium (Ca), Copper (Cu)	Chlorosis (Fe, Zn), tip dieback (Ca, B), distorted leaves (Zn, B), wilting shoots (Cu)

Note: Mobility is not absolute. Stress (drought, pH imbalance) or multiple deficiencies can shift symptom patterns.

Step 2: What Is the Symptom Pattern?

Symptom	Likely Deficient Nutrients	Visual Clues
Whole-leaf yellowing (general chlorosis)	N, S	Lower leaves pale (N); uniform yellowing (S)
Interveinal chlorosis	Mg, Fe, Mn	Green veins with yellow areas in between (young=Fe; older=Mg)
Leaf edge scorch/necrosis	K, B	Browning or drying of edges (K); brittle or thickened margins (B)
Tip or shoot dieback	Ca, B, Cu	Dying growing tips (Ca); brittle or hollow stems (B); shoot wilting (Cu)
Distorted or crinkled new leaves	Zn, B	Stunted or small curled leaves (Zn); thick, brittle young leaves (B)
Purpling or reddish leaves	P	Often seen in cool or acidic onditions; early root stress indicator

! Step 3: Rule Out Non-Nutritional Causes

Before applying nutrients, always check for other causes:

- Drought or waterlogging
- Insect pest damage or diseases
- Herbicide or chemical injury
- Extreme temperatures (heat/cold)
- Root binding in containers

Corrective Actions: Practical & Safe Nutrient Application

- If symptoms persist after watering and pest management, proceed with tissue or soil testing before corrective fertilization.
- When in doubt, start with a low-dose foliar spray and monitor response.
- Apply nutrients via soil/media or foliar sprays, depending on the nutrient and nursery condition. Always use proper dilutions, avoid over-application, and monitor plant response carefully.
- Start with small test batches before applying corrections across the nursery. Monitor symptoms and adjust gradually. Prevention through balanced media and scheduled nutrition is always better than reactive correction.

Dilution Formula for Foliar Sprays

% Concentration = (grams of fertilizer / liters of water) × 100