

# A Guide to Identify Mineral Nutrient Deficiency Symptoms in Crop Plants



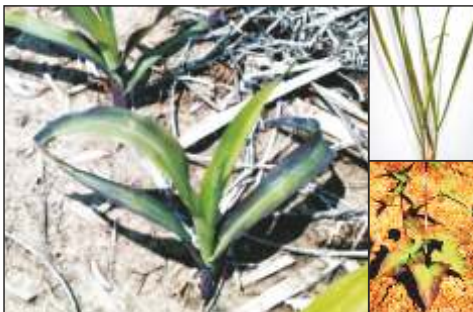
## Deficiency Symptoms of Mineral Nutrients in Crop Plants

### Nitrogen (N)

- Deficiency appears first on older leaves
- Chlorosis, slow growth, fewer leaves, stunted plants
- Lower protein and early maturity of crop
- Reduced tillering and yield
- **Foliar spray: 1-2% urea**



*Nitrogen deficiency*



*Phosphorus deficiency*

### Phosphorus (P)

- Dark-green or blue-green foliage, acute leaf angles
- Red, purple or brown pigmentation of leaves due to anthocyanin production
- Reduced stature, suppression of tillering
- Prolonged dormancy, early senescence
- Decrease in number of flowers and buds
- **Foliar spray: 2% di-ammonium phosphate**

## Potassium (K)

- Symptoms generally appear on older leaves first
- Yellowing/scorching along leaf margins
- Weakened stalks (lodging), slow growth
- Reduced disease resistance, poorly developed roots
- Small and shriveled grain or fruit, reduced yield
- **Foliar spray: 1% potassium chloride**



*Potassium deficiency*



*Magnesium deficiency*

## Magnesium (Mg)

- Symptoms first appear on older leaves
- Mottling and yellowing start at the leaf tips and progress to the center to the veins, which often remain green
- Rusty specks and necrotic spots may appear on upper leaves in advanced stages
- **Foliar spray: 0.5% magnesium sulphate + 1% urea**

## Calcium (Ca)

- Malformation or distortion of the young leaves, hooking of leaf tips
- Roots may become short, stubby and brown
- Chlorosis occurs along the margins of younger leaves which become necrotic.
- **Foliar spray: 0.5% calcium nitrate/calcium chloride**



*Calcium deficiency*



*Sulphur deficiency*

## Sulphur (S)

- Symptoms similar to (N) Nitrogen but occur on younger leaves in upper canopy first
- Brightly chlorotic, yellow-green and stunted plants
- Leaf veins tend to remain green
- **Foliar spray: 0.5% wettable sulphur/ ammonium thiosulfate**

### Iron (Fe)

- Intervenealchlorosis, with distinct green veins
- Dead spots may develop between veins
- Leaves drop and dry prematurely
- Whole leaf turns papery white in advanced stages
- **Foliar spray: 0.1 - 0.2% ferrous sulphate/ferrous ammonium sulphate**



*Iron deficiency*



*Manganese deficiency*

### Manganese (Mn)

- Symptoms may first appear in young leaves
- Intervenealchlorotic patterns and necrotic spotting
- **Foliar spray: 0.05-0.1% manganese sulphate**

### Zinc (Zn)

- Bright Intervenealchlorosis in young leaves, with purple or dead spots starting with older leaves
- Leaves are close together, reduced in size, with distorted or puckered margins
- **Foliar spray: 0.1-0.2% zinc sulphate**



*Zinc deficiency*



*Boron deficiency*

### Boron (B)

- Slows and stunts growth
- Causes distorted and dead growing tips (including apical buds), hollow stems and deformed fruit
- Internal tissue breakdown
- **Foliar spray: 0.05% borax**



### **Copper (Cu)**

- New growth is small, mis-shapen and wilted
- Causes bluish green leaves which may wither or fail to unfold
- Younger leaf tips may be yellow at edge
- Growing tips may form rosettes
- **Foliar spray: 0.01-0.05% copper sulphate**



*Copper deficiency*



*Molybdenum deficiency*

### **Molybdenum (Mo)**

- Pale leaves resembling (N) Nitrogen deficiency, along with marginal leaf chlorosis
- Yellow mottling and dead spots on leaves
- Interveinal chlorosis on older leaves
- Whip-tail like symptom in cole crops
- **Foliar spray: 0.1% sodium molybdate**

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#### ***Published by***

Publication Committee, Pusa Krishi Vigyan Mela (PKVM) 2025

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#### ***Printed at***

MS Printers, C-108/1, Back Side, Naraina Industrial Area, Phase-1,  
New Delhi-110 028, Phone No. 011-45104606