



## Essential Nutrients which Are Important In Bedding Plant Fertilization

# FACT SHEET

**Nitrogen: N** - Involved in the structure of amino acids, proteins, enzymes, and nucleic acids. Deficiency Symptoms: Stunted, pale green to yellow, weak stem, necrotic symptoms develop at a later stage.

Corrective Procedures: Applications include calcium nitrate ( $\text{CaNO}_3$ ) or potassium nitrate ( $\text{KNO}_3$ ), or 15-5-15 at the rate of 300 to 400 ppm N. Do not over apply, a single application at 300 to 400 ppm N should return the lower leaves a normal green colour within 1 to 2 weeks.

**Phosphorus: P** - Involved in energy transfer (ADP), nucleic acids, enzymes, and membrane structure, Plays an important role in root and floral development and stimulates rapid plant growth.

Deficiency Symptoms: Slow and reduced growth, dark green foliage turning purple pigmentation on older leaves—accumulation of anthocyanin, necrotic patches occur on the leaf margins at the advanced stage.

Corrective Procedure: Applications of 20-10-20 at the rate of 200 ppm will supply 44 ppm of P. Also avoid cool night temperatures which can cause inactivity of root system. Begin with adequate soil media levels.

**Potassium: K** - Maintains the ionic balance and water status in plants, pH regulation of cell sap, opening and closing of stomata, photosynthesis, sugar translocation, enzyme activity. Deficiency Symptoms: Slow growth, marginal chlorosis on older leaves, burned or scorched appearance at the advanced stage.

Corrective Procedures: Applications include potassium nitrate ( $\text{KNO}_3$ ) or 15-5-15 at the rate of 300 to 400 ppm K. One or two corrective K fertilizations will return the chlorotic tissue to the normal green color within 1 to 2 weeks.

**Calcium: Ca** - Constituent of cell walls, maintains cell wall integrity and membrane permeability, enhances pollen germination and growth, activates a number of enzymes for cell mitosis, division and elongation.

Deficiency Symptoms: Curled and distorted leaves, strap-like leaves on top, tips turning brown to black, vascular breakdown at the base of the plant, short roots with comb-like or "herring bone effect".

Corrective Procedures: Supplemental applications of calcium nitrate ( $\text{CaNO}_3$ ) at 200 ppm Ca. Visible improvements should be evident on the new growth within 2-3 weeks. Do not over apply and allow the substrate to dry before irrigating to prevent poor uptake of calcium, or application of small amounts of soluble gypsum to media and water in.

**Magnesium: Mg** - A component of the chlorophyll molecule and involved in enzyme activation. Required for phosphate uptake and the phosphorylation process within the plant.

Deficiency Symptoms: Interveinal chlorosis on older leaves, deformation of the lower leaves at the advanced stage.

Corrective Procedure: Magnesium Sulfate (Epsom Salts) application to the substrate at the rate of 1 pound per 100 gallons of water. Do not mix with other fertilizers. A corrective fertilization will return the chlorotic tissue to the normal green colour within 1 to 2 weeks.

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**Sulfur: S** - Constituent of two amino acids, cystine and thiamine, contribute to odor and taste of some plants.  
Deficiency Symptoms: Slower growth, general loss of green color, overall the plant appears to be a lighter green.  
Corrective Procedures: Magnesium sulfate (Epsom salts) application to the substrate at the rate of 1 pound per 100 gallons of water. Do not mix with other fertilizers. A corrective fertilization will return the chlorotic tissue to the normal green colour within 1-2 weeks.

**Iron: Fe** - Necessary for the synthesis of chlorophyll, component of many enzyme and electron transport systems, component of protein ferredoxin.  
Deficiency Symptoms: Interveinal chlorosis of younger leaves, younger leaves become a bleached yellow at the advanced stage leading to necrotic burn on the tips and margins.  
Corrective Procedures: Supplemental applications of iron chelate to the root substrate at the rate of 1 ounce per 15 gallons of water. Rinse the foliage after the application. Visible improvements should be evident within 1-2 weeks.

**Manganese: Mn** - Involved in pollen germination, respiration, photosynthesis, and nitrogen assimilation. Required for lateral root growth and elongation of growing axis of epicotyl or hypocotyls.  
Deficiency Symptoms: Reduced and stunted growth with interveinal chlorosis on younger leaves. Poor root growth and slow emergence.  
Corrective Procedure: Add 0.5 oz of manganese sulfate per 100 gallons of water. Apply to the substrate as a drench. Do not over apply. Another corrective treatment is to apply a foliar spray of manganese sulfate at a rate of 2 oz per 100 gallons. This will provide 40 ppm of manganese. Or use a commercial product at label rate.

**Zinc: Zn** - Component and an activator of enzymes. Production of IAA in the plant which stimulates all new meristematic growth and cell differentiation.  
Deficiency Symptoms: Upper new leaves will curl with rosette appearance, small leaves and short internodes, chlorosis in the interveinal areas, leaves will die off and flowers will be small and abscise.  
Corrective Procedure: Add 0.5 oz of zinc sulfate per 100 gallons of water. Apply to substrate as a drench. Another corrective treatment is to apply a foliar spray of zinc sulfate at a rate of 2 oz per 100 gallons of water. This will provide 56 ppm of zinc. Do not over apply. Or use a commercial product at label rate.

**Copper: Cu** - Required for the activation of several enzymes, needed for photosynthesis, involved in the metabolism of carbohydrates and proteins.  
Deficiency Symptoms: Reduced or stunted growth, distortion of the younger leaves and necrosis of the apical meristem.  
Corrective Procedures: Add 0.5 oz of copper sulfate per 100 gallons of water. Apply to substrate as a drench. This will provide 9.3 ppm of copper. Do not over apply. Another corrective treatment is to use a commercial product as a foliar spray at label rate.

**Boron: B** - Associated with carbohydrate chemistry, pollen germination, and cellular activities (division, differentiation, maturation, respiration and growth).  
Deficiency Symptoms: Stunting, discolouration, possible death of the growing tips, bud abortion, lack of fruit set and development, roots are stunted with swollen stubby secondary roots.  
Corrective Procedure: Add 0.75 oz of Borax per 100 gallons of water or 0.43 oz of Solubor per 100 gallons of water. Apply to substrate as a drench. This will provide 6.25 ppm of boron.