

9 Nutrient Deficiency Symptoms

This section describes visual symptoms of moderate to severe nutrient deficiencies. These deficiencies are not always due to insufficient nutrient supplies in the soil. Symptoms are often induced by poor root development, root damage, unfavorable soil conditions (dry, water-logged, or compacted), or unfavorable weather. Nutrient availability is highly variable, strongly influenced by management decisions, and is only one component of soil productivity. Therefore, correction does not automatically require application of the suspected nutrient.

Mobile elements, like nitrogen, may become unavailable to plants because of leaching or gasification. Soil compaction, dry soil, soil where water has ponded, and inadequate rooting are examples of soil and plant conditions that may limit nutrient uptake. Specific nutrient deficiencies can be difficult to diagnose accurately. Soil and/or plant analysis may help identify and establish the cause of the symptoms. With these analyses be aware of possible nutrient interactions that may influence results.

Boron (B)

Boron deficiency is rare. Irregular white spots occur between leaf veins and may combine into white stripes with a raised waxy appearance. Bush-shaped plants often fail to produce a tassel or ear. Deficiency is favored by drought, high pH and sandy soil low in organic matter. Boron toxicity can cause yellow, dying leaf margins and tips.

Calcium (Ca)

Symptoms of calcium deficiency are rare. Seedling leaf tips adhere to the next lower leaf, resulting in laddering effect and failure to unfurl normally. Deficiency is favored by very low pH (below 5.5) and high magnesium or potassium level.

Copper (Cu)

Copper deficiency is rare. Young leaves yellow as they emerge from the whorl and may die at the tip and edges. Stalks are soft and flexible. Deficiency is favored by high organic matter soils.

Iron (Fe)



Iron deficiency symptoms are rare. The upper leaves turn white between the veins, affecting the entire length. Symptoms are favored by high pH (alkaline) soil, cool weather, and wet, compacted soil.

Magnesium (Mg)



Yellow-white streaking occurs between veins of lower leaves if magnesium is deficient. Eventually, margins and tips of older leaves become reddish-purple, then die. Deficiency is favored by low pH, sandy soil and high potassium levels.



Manganese (Mn)



Manganese deficiency is rare. The area between leaf veins turns pale green-yellow. Stalks are thin and limber. Symptoms are favored by peat or muck soil, high pH and sandy soil high in organic matter.

Molybdenum (Mo)

Molybdenum deficiency is rare. Young leaves sometimes twist, wilt and die along margins. Older leaves die at the tip, along margins and between veins. Deficiency is favored by low pH and strong soil weathering.

Nitrogen (N)



Nitrogen-deficient plants are spindly, pale and stunted. Lower leaves develop a yellow-orange color in the shape of an inverted "V" beginning at the tip and following

the midvein. Leaves may begin to die (fire) at the tip. Symptoms advance up the plant to younger leaves. Ears are small and pinched at the tip. Symptoms are favored by cold, ponded, dry, or low organic matter soil, and incorporation of low-nitrogen residues.

Phosphorus (P)



Leaves of young phosphorus-deficient plants are bluish-green and slightly narrowed, turning reddish-purple starting at the tips and along the edges. Leaf tips may die. If conditions for phosphorus uptake improve, newer

leaves may be symptom-free. Symptoms are seldom observed on knee-high and larger plants. Ears may be small and misshapen, twisted with one or more kernel rows missing on one side.

Potassium (K)



Symptoms of potassium deficiency are seldom seen before plants are knee-high. Edges of lower leaves turn yellow and die (fire), starting at the tip. Leaves may break away. Plants are shortened. Ears are small and chaffy with poor tip-fill.

Deficiency is favored by wet or compacted soils, sandy or strongly weathered soil, and organic soil. Heavy potassium removal by previous crop can also favor deficiency.

Sulfur (S)



Deficiency of sulfur causes stunted, slow-growing and yellow plants. Yellowing occurs between veins, especially of younger (upper) leaves. Older plants rarely show symptoms. Symptoms are favored by cold, wet soil, low pH, and low organic matter.

Zinc (Zn)



Symptoms of zinc deficiency are rare beyond the seedling stage. Yellow to white bleached bands appear on the lower part of leaves while the midvein, margins and tip remain green. Newly affected leaves are sometimes described as "white buds."

The deficiency is favored by high soil phosphorus, high pH, cool, wet soil and low organic matter – such as from exposed subsoil.