Possible Causes of Nutrient Deficiency Symptoms in Corn

- Nutrient deficiencies in corn may be caused by environmental factors including weather, soil conditions, and nutrient availability.
- Corn nutrient deficiencies may also occur due to processes within the plant, problems with root uptake, or an actual soil deficiency.
- If nutrient deficiency symptoms occur, tissue and soil fertility tests should be taken to diagnose the nutrient deficiency prior to additional fertilizer applications.

Potential Causes of Foliar Symptoms
- Slowed metabolism and photosynthesis from environmental conditions, including a combination of cool nighttime temperatures, cloudy weather, and saturated soils.
- Rapid plant growth triggered by warm temperatures that followed slow growth during cool weather.
- Less microbial activity and release of nutrients in cool, saturated soils.
- Compacted soils that can restrict root growth and cause poor drainage (Figure 1).
- Plants deficient of sulfur (S), magnesium (Mg), or zinc (Zn) nutrients are more likely to occur in soils that are: low in organic matter (S), acidic (Mg), or have a high pH (Zn).
- Carryover injury from fomesafen herbicide if the herbicide was misapplied. Corn leaf veins would appear white while interveinal tissue remains green.  

Foliar Symptoms

Nitrogen (N) deficiency causes the older leaves of the corn plant to turn pale or yellowish-green. The deficiency then starts to create a V shape, starting at the tip of the leaf (Figure 2).

Sulfur deficiency generally appears as a yellowing of young leaves. Sulfur deficiency is sometimes confused with N deficiency. Because S is not as easily translocated within the plant, younger leaves show the visual symptoms first (Figure 3).

A Zn-deficient corn plant exhibits interveinal chlorosis on the upper leaves. The veins, midrib, and leaf margin remain green. As the deficiency intensifies, bands (or “stripes”) develop on either side of the midrib and the leaves may turn almost white (Figure 4A). Additionally, a Zn-deficient corn plant may be stunted, i.e. shortened internodes on the stalk (Figure 4B).
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Corn Root Systems in Wet Soils
Soils saturated by heavy rains last fall or this spring may cause restricted crop growth and nutrient uptake. Compaction layers form when heavy farm equipment passes over wet ground. Compaction from one incident can remain over several seasons. These compaction layers can block root systems and limit nutrient availability. Wet soil conditions can also reduce soil oxygen levels, which can affect root growth and nutrient uptake. Continued crop growth through drier, sunnier weather may help some of these issues.

Management
Crop tissue testing can help determine nutrient deficiencies. Results from tissue and soil testing can help determine if the deficiency is due to soil availability or plant uptake and metabolism. Plant tissue analysis, during the growing season can provide S, Mg, and Zn levels in the plant at the time of sampling. Tissue analysis procedures vary by lab, but generally the corn ear leaf at silking should be sampled when S, Mg, and Zn levels are tested. An early-season tissue analysis can be done after seedling stage, but prior to tasseling.

When plants with a suspected nutrient deficiency are sampled, it is recommended a sample of unaffected plants at a similar stage also be collected. Early-season testing results can be used to determine if a supplemental fertilizer should be applied. A tissue test, in combination with a soil test, may give answers as to why nutrient levels are high or low in a plant. Alone, soil test results will be most useful for predicting nutrient needs for the following growing season, but may not give reliable results for S levels.

Plants can often outgrow symptoms. This is because soil warming encourages microbial activity and breakdown of organic material, which releases additional nutrients. Deeper root growth can also allow roots to reach water-soluble nutrients such as S and N that may have leached deeper into the soil with wet conditions. Root growth restricted by soil compaction can also limit the ability of a plant to acquire nutrients.

Summary
Corn between the V3 to V5 growth stages transitions from energy dependence on the seed to acquiring energy from photosynthesis. The cosmetic appearance of plants during these stages is often variable and can be due to an environmental effect. A wait-and-see approach can be taken during the vegetative stages, and a tissue analysis may be conducted at silking stage if symptoms persist into the season. Correcting the problem for the current season may not be feasible, but soil preparation for next season can include fertilizer applications based on soil test recommendations and compaction alleviation or prevention.

Sources: