Corn Nutrient Deficiency Symptoms

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

Causes of Nutrient Deficiencies and Similar Symptomology

Environmental Conditions

- 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.

Soil Conditions

- 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 the nutrients sulfur (S), magnesium (Mg), or zinc (Zn) are more likely to occur in soils that are: low in organic matter (S), acidic (Mg), or have a high pH (Zn).

Herbicide Carryover

- Carryover injury from fomesafen herbicide if the herbicide was misapplied. Corn leaf veins would appear white while interveinal tissue remains green.[1]

Nutrient Deficiency Foliar Symptoms

The older leaves of the corn plant may turn pale or yellowish-green when the plant is deficient in nitrogen (N). The deficiency then starts to create a V shape, starting at the tip of the leaf (Figure 2).[2]

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

Figure 1. Soil compaction may restrict root growth and heavy rainfall may cause water-soluble nutrients, such as nitrogen and sulfur, to leach below the root zone leading to nutrient deficiency symptoms in corn.

Figure 2. Nitrogen deficiency symptoms in corn. V-shaped yellowing starting at the leaf tip.

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 3).[2] Additionally, a Zn-deficient corn plant may be stunted causing shortened internodes on the stalk.

Corn Nutrient Deficiency Symptoms

Corn Root Systems in Wet Soils

Soils that may have been saturated by heavy rains in the past year may cause restricted crop growth and nutrient uptake (Figure 1). Compaction layers form when heavy farm equipment passes over wet ground. 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.

Nutrient Management

Results from tissue and soil testing can help determine if a 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.[3] Generally when testing S, Mg, and Zn levels, the corn ear leaf should be sampled at silking; however, analysis procedures may vary by lab.[4] An early-season tissue analysis can be done after the seedling stage, but prior to tasseling.

When plants with a suspected nutrient deficiency are sampled, it is recommended that 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. Soil test results alone 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.

Summary

A corn plant will transition from energy dependence on the seed to acquiring energy from photosynthesis between the V3 to V5 growth stage. 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 crop may not be feasible, but soil preparation for next season can include fertilizer applications based on soil test recommendations and compaction alleviation or prevention.

Figure 3. Young corn plant showing typical zinc deficiency symptoms. Note the broad white stripes on both sides of the leaf midrib. Photos courtesy of: University of Minnesota Extension, Zinc for Crop Production. www.extension.umn.edu

Sources:

[1] Gower, S. 2006. Fomesafen carryover to corn. Michigan State University. Field Crop Advisory Team Alert.

[2] Fernandez, F. 2009. Identifying nutrient deficiencies in corn. University of Illinois. The Bulletin No.13 Article 6.

[3] Stevens, G. Integrated pest management: Crop nutrient deficiencies and toxicities. University of Missouri-Columbia. IPM1016.

[4] Thom, W. O. et. al. 2000. Sampling for corn plant tissue analysis. Iowa State University Extension. NCH-15.

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For additional agronomic information, please contact your local seed representative.