AGRONOMIC ALERT
Technology Development by MONSANTO

Possible Causes of Nutrient Deficiency Symptoms in Corn

Several fields are showing what is believed to be nutrient deficiency. Several causes including weather, soil conditions, and nutrient availability may contribute to this symptom. Questions regarding whether the deficiency is due to processes within the plant, problems with root uptake, or an actual soil deficiency should be answered before making additional fertilizer applications this season.

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; more likely to occur in soils that are: low in organic matter (S), acidic (Mg), or have a high pH (Zn) may cause a striping symptom in leaves (Figure 2, page 2)
- Carryover injury from fomesafen herbicide if herbicide was misapplied. Corn leaf veins would appear white while interveinal tissue remains green.

Corn Root Systems in Wet Soils

Soils that were saturated by heavy rains last year and this spring may cause restricted crop growth and uptake of nutrients. Compaction layers formed last year during tillage, harvesting, and planting in wet soil conditions can remain over seasons. Root systems blocked by compaction layers have limited nutrient availability. Soil oxygen levels could also be lacking in wet conditions affecting root growth and nutrient uptake. Continued crop growth through drier, sunnier weather may help some of these issues.

Management

A tissue test can be done to determine which nutrients the crop plants are deficient in and help determine if it is due to a soil deficiency, or a problem with plant uptake and metabolism. Plant tissue analysis, during the growing season, can provide levels of S, Mg, and Zn in the plant at the time of sampling. Tissue analysis procedures vary by lab, but generally the 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 a suspected nutrient deficiency is being sampled, it is recommended a sample of unaffected plants at a similar stage be separately collected. Early-season results could be used to determine a rate of supplemental fertilizer. This test in combination with a soil test can give answers as to why nutrient levels are high or low in a plant. Alone, soil test results will be most

Figure 1. (Left) During early corn growth, heavy rainfall may cause water-soluble nutrients such as nitrogen and sulfur to leach below the root zone. (Right) Roots may not be able to reach available nutrients due to a compaction layer restricting root growth.

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season, but may not give reliable results for S levels.

Plants can often outgrow symptoms; soil warming encourages microbial activity and breakdown of organic material which releases additional nutrients. Deeper root growth could allow roots to reach water-soluble nutrients such as S and nitrogen 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.

Figure 2. Plants in an area of light green corn plants in a dark green field may actually appear to have stripes running the length of the leaves. Veins of affected plants appear green while areas between veins are light green.

Summary

Corn between the V3 to V5 growth stage transitions from energy dependence on the seed to acquiring energy from photosynthesis. Cosmetic appearance of plants during these stages is commonly variable and sensitive to the environment. A wait-and-see approach can be taken during the vegetative stages, and a tissue analysis 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 2011 can include fertilization according to soil test recommendations and compaction alleviation and prevention.

Sources: F. Fernandez. June 19, 2009. Identifying nutrient deficiencies in corn. University of Illinois. The Bulletin No. 13 Article 6.; G. Rehm. 2004. Striped corn: causes and corrections. University of Minnesota. Minnesota Crop News June 17, 2004.; G. Rehm and M. Schmitt. 1989. Sulfur for Minnesota soils (FO-00794-GO). University of Minnesota.; G. Rehm, C. Rosen, and M. Schmitt. 2002. Magnesium for crop production in Minnesota (FO-00725-GO). University of Minnesota.; G. Rehm and M. Schmitt. 2002. Zinc for crop production (FO-00720-GO). University of Minnesota.; S. Gower. June 22, 2006. Fomesafen carryover to corn. Michigan State University. Field Crop Advisory Team Alert.; MW.O. Thom, J.R. Brown, and C.O. Plank. 2000. Sampling for corn plant tissue analysis. National Corn Handbook (NCH-15).

Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible.
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