

Identifying Nutrient Deficiencies In Corn

Dr. Fabián Fernández

Assistant Professor of Soil Fertility and Plant Nutrition, University of Illinois

Last week (issue 12, June 12) I addressed some of the possible factors affecting nutrient availability and causing plant foliage to show deficiency symptoms. The Illinois State Water Survey says that wet conditions in March, April, and May were the fifth-wettest on record since 1895. Wet conditions and cloudy (low-light intensity) days this spring are causing crops to look nutrient-deficient. As I mentioned last week, the fact that plants look deficient does not mean that you need to hurry and apply nutrients to take care of the "problem." Many of what appear to be symptoms of nutrient deficiency will take care of themselves without the need for additional fertilizers once soils dry a little and the sun starts to shine on more regularly. If a deficiency continues after growing-season conditions improve, then corrective measures will be necessary to reverse the problem. Whether or not symptoms are true problems at this time, it is important to know the deficiency symptoms for various nutrients and under what conditions a deficiency is most likely to occur.

Once nutrients enter a plant, some are mobile and others are not. Mobile nutrients will cause deficiency symptoms to develop in older leaves, because nutrients present in the older leaves will move to new leaves to maintain the new growth. On the other hand, immobile nutrients will

cause new leaves to show greater deficiency symptoms, while older leaves might be completely green.

Deficiency symptoms for many of the essential nutrients have not been verified, or are very rare, in Illinois and will not be discussed here. Mobile nutrients that are known to cause deficiencies in corn include nitrogen, phosphorus, potassium, and magnesium. Sulfur is another nutrient that has been known to cause deficiency in corn, but it is not easily translocated in the plant. The only immobile nutrient known to cause deficiency in corn under some Illinois conditions is zinc.

Nitrogen (N) deficiency makes the older leaves (the bottom portion of the corn plant) turn pale or yellowish-green. The deficiency then starts to create a V shape, starting at the tip of the leaf. If the problem continues, the deficiency works its way up the plant from older to newer leaves. The stalks tend to be thin and spindly. N deficiency develops commonly in wet to saturated soils or under cool soil temperatures in the spring. N can leach out with heavy rainfall in light-textured (sandy) soils or can be denitrified in flooded soils when temperatures are warm. N deficiency can be induced after midseason or during other periods when soils tend to be dry. N deficiency can also occur in soils with large amounts of low-nitrogen-containing residues. Δ

DR. FABIÁN FERNÁNDEZ: Assistant Professor of Soil Fertility and Plant Nutrition, University of Illinois



Nitrogen Deficiency

Phosphorus (P) deficiency causes a distinct dark green with reddish to purplish leaf margins, typically starting from the tip. The deficiency is observed in the older leaves. Stunted growth is also typical. At early development stages some hybrids show purple colors even though P is not deficient, while other hybrids might not show this coloration even when P levels are limiting. P deficiency symptoms normally disappear by the time the plant is waist-high. Since P is fairly immobile in the soil, any soil condition that limits root growth (cool temperature, wet or very dry conditions, compaction) can induce the deficiency.



Phosphorus Deficiency

Potassium (K) deficiency is observed as yellowing and necrosis (death) of the edge of older leaves. When the problem persists, this deficiency will continue to move up from older to newer leaves, while the top leaves may look completely green. K deficiency can cause lodging of the crop later in the season because stalks are thin and not strong. As with P, soil conditions that restrict root growth can induce deficiency, especially at early stages of development when the root system is small. Soils with low K buffer capacity can cause the deficiency if an appropriate fertilization plan is not followed.



Potassium Deficiency

Magnesium (Mg) deficiency appears in lower leaves as yellow or white streaking between veins. The leaves eventually become reddish-purple, and the edge and tip die if the deficiency is severe. Deficiencies have been seen in isolated situations in Illinois. The soils most likely to be deficient in Mg include acidic and sandy soils throughout Illinois and low-CEC soils in southern Illinois. Deficiency is more likely where calcitic limestone (CaCO₃) rather than dolomitic limestone (CaMg(CO₃)₂) has been used in those soils.



Magnesium Deficiency

Sulfur (S) deficiency causes yellowing of the foliage. S deficiency is often confused with N deficiency. Since S is not easily translocated, deficiency tends to be more visible in the newer leaves, differently from the older leaves with N deficiency. It is not uncommon to see interveinal chlorosis of the newer leaves. The condition is typically observed in soils with low organic matter (including sandy soils), low pH, and cold and wet conditions that reduce mineralization (release) of S from organic matter. Since S is leachable, corn will often grow out of a S deficiency once the root system taps into the S that has accumulated in the subsurface soil.



Sulfur Deficiency

Zinc (Zn) deficiency is observed as light green to white stripes between veins or as wide bands starting at the base of the leaf and extending toward the tip of the newer leaves. The edge of the leaf as well as the midrib usually stay green. Usually corn can outgrow this problem, but in cases of severe deficiency, new leaves can be almost white. Zn deficiency is most commonly observed in soils low in organic matter, sandy soils with high pH (>7.3), cool and wet soils, or soils with very high P levels where Zn levels are marginal.



Zinc Deficiency

As I mentioned, the unfavorable conditions for crop growth this spring mean that observing some deficiency symptoms in young corn plants should not be cause for immediate alarm. However, if deficiencies continue after growing season conditions improve, it is important to confirm any deficiency before trying to correct the problem. Since the visual symptoms are sometimes not clear-cut, it could be beneficial to collect affected plants and conduct tissue nutrient analysis.