



Diagnosing Nutrient Deficiencies in Field Crops

One of the most useful steps in diagnosing nutrient deficiencies, is knowing how that nutrient acts in the plant. Nutrients are classified as either mobile or immobile:

- **Mobile nutrients** have the ability to be scavenged from the older, lower leaves, to the new, actively growing leaves when deficiencies occur. This leads to deficiency symptoms on the older leaves of the plant.
- **Immobile nutrients** can't easily move from the older leaves to the newer leaves, resulting in deficiency symptoms showing up in the newest growth.

The charts below separate nutrients between the two types:

Macronutrients vs Micronutrients

Mobile	Immobile
Nitrogen (N)	Calcium(Ca)
Phosphorus (P)	Sulfur (S)
Potassium (K)	Boron (B)
Magnesium (Mg)	Copper (Cu)
Chlorine (Cl)	Iron (Fe)
Molybdenum (Mo)	Maganese (Mn)
Nickel (Ni)	Zinc (Zn)

When diagnosing symptoms, it is always important to look for patterns throughout the field. Unless severe, nutrient deficiencies will typically be sporadic in the field. It is also important to figure out why the deficiency occurred in the first place. While weather events can greatly impact nutrient uptake, issues such as low soil nutrient levels, soil textures, pH levels, and compaction can all be common causes. It is also important to remember the environmental conditions and nutrient history of the field in question.

Often, deficiencies aren't caught until there is a visual symptom showing up on the plant. By the time a symptom shows up, yield potential has already been negatively impacted. Tissue testing throughout the growing season can provide a great value in uncovering potential issues, before there is any yield detriment. A tissue test can be done at any time in the crop's life cycle, but the procedure may change depending on the time of year. Typically, a test early in the season, will require the whole plant to be submitted, while later tests usually require the newest, fully developed leaf. Most testing labs will provide their preferred requirements. It can also be beneficial to soil test at the same time as tissue testing. This will provide insight into what's available to the plant in the soil, as well as what the plant is able to extract from the soil.

If a deficiency is noticed, there is usually still time to correct the issue and minimize losses. Obviously, the quicker the issue is dealt with, the less impact it will have on final yield. There are many ways to apply nutrients in-season. Macronutrients needed in large quantities are generally applied with a fertilizer spreader, injected with a side dress applicator, or even applied through irrigation pivots. Typically, micronutrients can best be applied as a foliar treatment through a sprayer, as the leaves can take up the small amount of needed nutrients.

It is important to minimize the risk of loss from a nutrient deficiency, as potential losses can become significant if not properly addressed. Replenishing soil nutrients after harvest is a critical first step in maximizing yield. As the following chart shows, 180 bushel grain corn will remove 63 pounds of Phosphorus and 45 pounds of Potassium. There are many diagnostic tools available to use as well as soil and tissue testing to help improve the health of your soil and minimize yield losses from nutrient deficiencies.

Nutrients Removed from 180 Bushel Corn Crop

Crop	Unit	N	P ₂ O ₅	K ₂ O	S
Corn Grain	Bu	0.67	0.35	0.25	0.08
Corn Silage (67% water)	Bu	1.6	0.51	1.2	0.18
Corn Silage (67% water)	Ton	9.7	3.1	7.3	1.1
Corn Stover	Bu	0.45	0.16	1.1	0.07
Corn Stover	Ton	16	5.8	40	2.6

Consult your agronomist with any questions or concerns you may have about nutrient deficiencies in field crops and how to diagnose them.

Appendix A: Common Nutrient Deficiencies in Corn & Soybeans



Nitrogen:

Pale green plants, chlorosis or necrosis advancing from the leaf tip along the midrib on older leaves.



Phosphorus:

Dark green plants, may be stunted, purple or reddish leaves and stems on lower leaves. Usually occurs early in the growing season and cool temperatures.



Potassium:

Yellowing along lower leaf edges and eventual leaf death. Weakened stalks, shortened internodes.



Sulfur:

Overall yellowing of plant, starting with young leaves.



Zinc:

Pale green plants, white bands along midrib in corn, stunted plants, smaller leaves, shortened internodes.

Photo Credit: International Plant Nutrition Institute

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