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MOM Minimize Environmental Impact Optimize Harvest Yield Maximize Input Utilization

IN YOUR FIELDS

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IN YOUR FIELDS is a newsletter that shares field observations and management tips for farmers in East-Central Illinois. Join Dr. Brown as he works to improve environmental quality and farm profitability simultaneously.

CORN COLOR DIFFERENCES. Many corn fields across East-Central Illinois are showing visible nutrient stress as rapid top growth outpaces root uptake. Cool, wet weather in April and early May limited early root growth. Recent warm temperatures expedited above-ground growth, creating a temporary imbalance between nutrient demand and root uptake capacity. Continued soil warming should resolve the color difference. However, additional stress factors, such as localized compaction, herbicide injury, or extended saturated soil conditions, may cause differences to appear across the field. Nutrients deficient, causing the crop to take on a yellow cast, are likely nitrogen or sulfur. A purple cast is likely due to a temporary phosphorus shortage.

LOOK AT THE ROOTS. If a combination of potential nutrient shortages appears obvious, dig up a few plants and closely examine the extent of branching of the fibrous root system. If the hair-like, shorter roots are absent, look closely in the soil for grape colaspis. Grape colaspis is a very small white grub that takes on the shape of a comma when disturbed. If you don't look carefully at the soil when you remove it, you can miss them. Grape Colaspis will pupate into a beetle that can easily be mistaken for a bean leaf beetle. Unlike bean leaf beetles, Grape Colaspis adults do not have the characteristic black triangle. They are tan in color and appear to have faint rows of tiny white dots on the hardened wing pads (that appear to make up a shell). I normally diagnose the problem after the feeding damage has caused a nutrient deficiency, giving the larvae enough time to pupate and hatch as the adult beetle that feeds on the corn leaves. There is no rescue treatment for Grape Colaspis. Most plants appear to recover once the feeding stops. An insecticide seed treatment may be an option for future crops as a preventative treatment. I have found no research that suggests the insect will return to the same location in future cropping seasons.

TIME TO TRACK NITROGEN. This is an excellent time to begin tracking nutrients, especially in fields that experienced excessive rainfall or temporary flooding this spring. Most of the nitrogen applied in the Fall with stabilizer or in the Spring without, converts to nitrate-N by early May. Warm, saturated soils can rapidly accelerate denitrification, with measurable nitrogen loss often beginning within 24 to 48 hours after saturation. The rate of nitrogen loss of the nitrate-N form is about 6% per day of saturation, based on research from over 40 years ago. If there were 200 pounds of nitrate-N in saturated soil there would be an estimated loss of 12 pounds of N per day. Five days of saturation would result in an estimated loss of 60 pounds of N. Multiple saturation periods would lead to higher potential losses. Experience with nitrogen tracking suggests that significant nitrogen losses may have already occurred to the south. Samples collected so far this year in Champaign and Vermilion counties do not suggest such losses have occurred.

WE HAVE MUCH TO LEARN ABOUT SOIL NITROGEN. Tile water samples collected in East-Central Illinois reflect elevated nitrate-N concentrations, originating from post-soybean-harvest fields. I think a significant amount of unused applied N for corn is not lost but is incorporated into organic matter as readily available organic nitrogen, which becomes plant-available with a little help from soil microbes. Producers who apply the above-recommended N rates are likely to have higher concentrations of readily available plant-available N, leading to greater microbial release of plant-usable N. A September maturity of the soybean crop, coupled with continued warm soils following harvest, may create an environment for N release, since there is no sink for nitrate-N (crop harvested). If this theory is correct, it would promote the use of a cover crop to capture the mineralized N following soybeans. Research has proven that nitrate-N capture does occur. The challenge is predicting when it will be released for plant uptake.

TRACKING NUTRIENTS, SPECIFICALLY NITROGEN, helps relieve the stress of not knowing whether significant nitrogen loss has occurred. It provides a rough estimate of pounds of Plant-Available N (nitrate + ammonium N) in the upper 2 feet of the soil profile. Multiply the nitrate and ammonium ppm by 4 at 0 to 12 inches, add them together, and apply the same calculation at 12 to 24 inches. Adding both estimates together provides an estimate of plant-available N at 0 to 12 inches and 12 to 24 inches. Testing soil samples collected for additional nutrients provides estimates of sulfur, boron, and zinc as well. Testing the same location over time provides a snapshot of nutrient dynamics, which I commonly refer to as nutrient behavior.

TRACKING TILE WATER NITRATE-N CONCENTRATION HELPS DETECT NUTRIENT LEAKAGE away from the crop, an indicator that nitrogen is moving beyond the root zone, reducing nitrogen-use efficiency while increasing nitrate loading risk to surface waters. Tracking tile water nitrate-N is simple and inexpensive. It does not estimate pounds lost; rather, it creates a trail of the tile water's concentration of nitrate-N, something I refer to as the tile water's "personality". The concentration may increase following N applications, whether from fall or post-emergent applications. Without flow measurements, pounds of loss cannot be determined; however, an increase in nitrate-N concentration suggests a loss, which likely can be minimized through changes in crop management.

IF YOU WANT MORE INFORMATION about nutrient tracking or would like to learn more about the content of this newsletter, send an email to docofsoil@outlook.com or visit www.visionaryagronomics.com.

Until next time…

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"I do not want to protect the environment from production agriculture. I want to create a version of production agriculture where the environment does not need protecting."

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Maximize Input Utilization

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