September 2024

Agronomist Notebook

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In last month's newsletter, I discussed preharvest scouting efforts to gain insights, if nothing else, to help prioritize harvest to maximize harvestable yield. Now that harvest is well underway for much of the area, we are gaining insights into how our 2024 crop will perform. As we go through harvest, it may be worth the time to keep a notebook in the cab of the combine and, if nothing else, record a few thoughts on the field performance of any items that worked well or areas for improvement.

Phosphorus and Potassium Applications

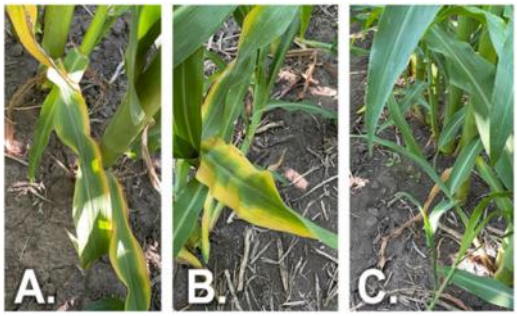
One item I know that may be on the minds of many growers is the item with low grain prices and high input prices, such as fertilizer. It may be a natural reaction that, in times of high fertilizer prices, cut back for the 2025 growing season. This may be an appropriate item to consider for some fields, but it may come with some risk for the following year's crop, depending on current soil test levels and field conditions next year that might affect root growth.

Most soils in EC IL will be classified as medium to heavy-textured soils. If soil test levels currently exceed 25-30 ppm for P and 150-175 ppm for K, it may pose a low risk for yield loss in 2025. However, this reward of investing in soil fertility and building soil test levels does not come without some risk if soil fertility rates are reduced for the 2025 growing season. The main concern is if root growth becomes restricted for any reason next year, it may translate into nutrient deficiencies even though soil fertility may be adequate. Many of the nutrient deficiencies I witnessed this year generally fell into two categories, not including nitrogen.

1. Restricted Root Growth —Generally, some compaction was generated early in the season that prevented normal root growth. Examples may include soil compaction generated from either tillage or planting equipment, resulting in subsurface compaction layers and sidewall compaction in many cases. Evidence of restricted root growth may be visible from "Tomahawk Roots," pancaking of plant roots, or horizontal root growth.

2. Unrealized need for key nutrients such as Sulfur, Boron, and Zinc. Until recent years, soil organic matter and managing soil pH to a range of 6.2 – 6.7 have been key to providing crops with these key nutrients. However, with the acceleration of modern hybrids and varieties along with clean air acts, soil OM can't keep up with these demands, and the need to supply these nutrients is in actual demand.

Field conditions that promote restricted root growth should be avoided. Plant roots generally take up nutrients through at least one mechanism, but often more than one process.



Mass Flow – movement of dissolved nutrients into the plant as the plant up takes water for transpiration, most all nutrients are taken up in this manor except phosphorus.

Diffusion – movement of nutrients to the root interception in response to a concentration gradient. High concentration to low concentration to form an equilibrium. Key for P, K, S, Fe, and Zn.

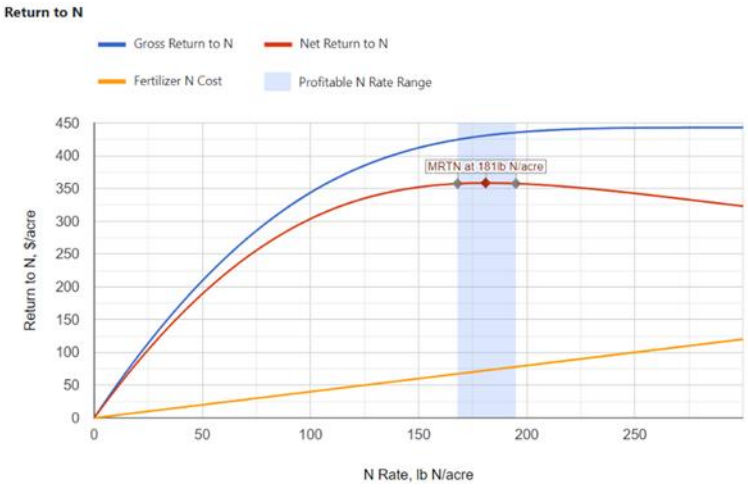
Root Interception – root growth must occur to intercept soil colloids that contain nutrients for absorption. This is a key pathway for calcium and magnesium but minor for other nutrients taken up in this pathway. Ca, Mg, Fe, Mn, and Zinc may all be taken up through root interception.

In conclusion, anything that restricts root growth or movement of roots and the flow of water throughout the soil will also prevent the movement or interception of key plant nutrients. A key example I witnessed many times this year, from in-season nutrient testing to field scouting, was potassium. In every case I witnessed potassium foliar deficiency symptoms this year, soil test levels were adequate. Restricted root growth of some sort was the root cause of potassium not making its way

into the plant. If soil fertility is reduced in 2024 and another wet spring, real nutrient deficiencies may be observed later into the season as plant roots cannot uptake adequate amounts of potassium and other essential plant nutrients.

Nitrogen Management

Nitrogen is one other key plant nutrient that may need to be addressed to ensure ROI in 2025. Suppose growers have not considered using the Corn Nitrogen Rate Calculator. In that case, this year may be the year to utilize this publicly available tool at the following web address. www.cornnratecalc.org This tool finds the Maximum Return to N and the Most Profitable N Rate or MRTN. The tool will calculate the optimum rate by setting a few parameters: location, crop rotation, n source, n price/ton, and grain selling price. This may be cost savings for growers that may be applying excessive rates of N when economics are considered. This tool has been vetted with over a decade of field-scale research trials across the Midwest. Other items to consider with nitrogen applications are taking advantage of cheaper N prices from anhydrous ammonia but applying no more than 1/3 to ½ of the total need in fall with nitrogen stabilizers. Then, next spring, apply the remaining amount in-season prior to rapid uptake that occurs mid to late vegetative growth in corn and utilize stabilizers in-season to protect against loss that might arise from leaching or volatilization of nitrogen that may be in vulnerable forms.



Weed Control

Shifting gears to weed control is a real issue for many corn and soybean fields this fall, especially for soybean fields. Because of such an issue for some soybean fields, a preharvest aide of a paraquat-containing herbicide application is required to prevent problems with the harvestability of the soybean crop. I will ask growers that find fields at harvest with less than desirable weed control if they control the controllable and manage items out of our control, such as environmental conditions at the time of application. Controllable include effective tank mix partners to control targeted weeds, proper adjuvant selection, and nozzle selection, which are a few examples of items in our control. Whereas temperature and humidity are out of our control, did we recognize these conditions and make appropriate changes to spray application to maximize herbicide effectiveness? Below are a few items to consider when making seed and crop protection decisions for 2025.

1. Some soybean herbicide trait platforms advertise a 2.7 bu/A advantage over other trait platforms. Remember that weeds are not controlled and that bu/A advantage quickly goes away. Research from many universities in the US and Canada has documented over many years that if post-herbicide applications do not effectively control weeds, yield reductions may be as high as 20 bu/A. The graph below illustrates the importance of starting free from weeds in soybeans. This research was from Michigan State University.

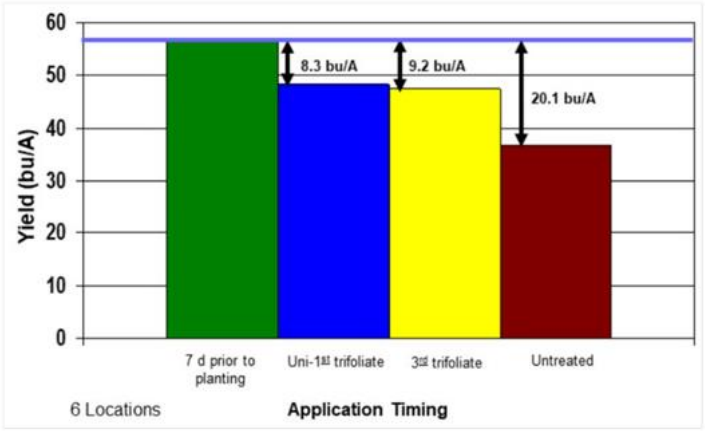


Figure 1. Soybean yield due to delayed burndown herbicide applications. Burndown applications were made seven days prior to planting at unifoliate to V1 (1-trifoliate) soybean and V3 (3-trifoliate) soybean.

2. Another item to consider is what is the field tolerances of other herbicides such as herbicides from Group 14 or PPO, metribuzin, and even the STS trait that improves tolerances to ALS or Group 2 herbicides. Suppose soybean varieties are known to have high field tolerance to any of the previously mentioned herbicides or groups. In that case, we can leverage higher labeled herbicide application rates and minimize the risk of negative soybean response. Extension Weed Science Specialists from the U of I have suggested rates of 15 oz/A of metribuzin 75DF may be necessary in pre-emerge residual applications to control waterhemp effectively. However, crop responses to metribuzin are a genuine concern at these suggested rates in times of cool, wet weather or even high soil pH. Knowing field tolerances to herbicides of essential soybean herbicides will be vital in avoiding this

concern that may result in replant scenarios given the right environmental conditions. Another item around pre-emerge residuals that I am concerned with is the need for incorporation. Often, when I receive complaints that residuals did not seem to be effective, I first look to whether they were incorporated with tillage and what rainfall patterns were like for approximately ten days after application. If residuals were incorporated, I look to see what the tillage depth might have been. Generally, if incorporation was greater than two inches, the herbicide was likely diluted to an ineffective rate because of too much mixing. If tillage is likely not a factor, then too little or too much rainfall occurs. Either not enough for activation, or it was leached out of the zone where weed seeds might germinate. Both of these items are about the water solubility of a herbicide. Generally, good residual herbicide plans might include a herbicide with a high water solubility with a pre-emerge application and then a lower solubility herbicide with a post-pass because there is generally less rainfall. The only type of herbicide that truly needs to be incorporated is the "yellows" or Group 3, such as those older formulations of pendimethalin or trifluralin that were significantly degraded when exposed to direct sunlight.

If growers or readers of this newsletter have questions or concerns about management strategies for this year, Illini FS or I would welcome the opportunity to partner with you.