NOTES FROM THE FIELD

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Production Agriculture in 2020

Now it is time to reflect on changes to consider.

Make time to refresh or change some of the long-term traditional practices or to challenge how decisions are made. Here is a compilation of things to consider as we enter the first growing season of a new decade, 2020.

Nitrogen impacts both the environment and farm economics.

It is second only to sediment as an impairment to water resources in Illinois. It is considered the most important nutrient input for corn production and is one of the top two input costs. Each year new pattern tiled fields makes it easier for unused soil nitrate-N to find its way from the point-of-application to ditches, rivers, lakes and eventually into the Gulf of Mexico, increasing the risk impaired drinking water (elevated nitrate-N) and causing eutrophication (accelerated algae growth).

Changing management practices to reduce N loss without impacting harvest yield will increase farm profitability by optimizing the investment in N applied (use it, don't lose it). It is all about M.O.M., Minimize environmental impact by Optimizing harvest yield and Maximizing input utilization. Focus on N management in 2020 to improve both farm profitability and environmental quality.

The soil holds several thousand pounds of N.

About 95% of the N found in our East-Central Illinois soils is bound organically and is unavailable to the plant for uptake. Only a fraction of the bound N is released on an annual basis, depending upon microbial activity and a process referred to as mineralization (plant-unavailable N to plant-available N). It is assumed that approximately 25 pounds of N can be released as plant-available N for each percent of soil organic matter (cropping season). If the soil has 3% organic matter, approximately 75 pounds of N can be released during the growing season.

Tillage enhances release of plant-available N (PAN) from soil organic matter.

Tillage increases mineralization of organic matter by providing an environment favorable for microbial activity. A short-term benefit of increased N release means more N becomes available for crop uptake. Unfortunately, the faster plant-available N is released from soil organic matter, the faster it oxidizes, minimizing soil productivity long-term. If we want the soil to remain a productive natural resource for future generations, now is the time to understand management practices that will maintain its productivity both in 2020 and beyond.

Success is not final. Failure is not fatal. It is the courage to continue that counts.
Winston Churchill

Soil releases a significant amount of PAN each growing season.

If each percent of organic matter can release approximately 25 pounds of plant-available N annually, a soil with 3% organic matter may release as much as 75 pounds of N during the growing season. Unfortunately, it is nearly impossible to estimate or predict how much N is being released, since the amount is dependent upon the soil environment and microbial activity, and both are unpredictable each growing season. Mineralization of soil organic N is likely the primary cause of nitrate-N found in subsurface tiles and drainage ditches. Research is starting to focus more attention on organic N release, especially in fields following soybean production.

Apply Phosphorus (P) and Potassium (K) by removal, not just soil tests.

Having an estimate of plant-available nutrients in the upper soil horizon will remain a part of making phosphorus and potassium recommendations. Determination of nutrient availability on a grid-basis ushered-in an era of "precision farming". However, making phosphorus and potassium recommendations is moving toward a removal-based recommendation.

Adding nutrients back to the areas of the field where they were removed by grain just makes sense. Areas of highest yield should receive the highest nutrient applications. Areas of below-expectation yield are likely yield-limiting as a result of other growth factors (water, soil type, soil structure, etc.). Adding additional nutrients may not have an impact on productivity.

Traditional soils tests will remain a part of nutrient management, but they will eventually be used to establish a trend of plant-available P and K availability, not as the basis for application recommendations. Traditional soil tests will remain an important part of nutrient management by identifying areas that may not need additional fertilizer due to high test levels.

Apply nutrients ahead of each crop.

Making fertilizer applications based on estimated removal makes economic sense. Yield provides the basis for nutrient rate recommendations and the value of the harvested crop provides income to cover the costs. High yielding crops will hopefully generate more income to pay for the higher removal rates. Although low-yielding crops

will generate less income, less nutrients will be recommended based upon less nutrients removed.

Trusted harvest yield mapping will be needed for decision-making.

The importance of harvest yield data management continues to be emphasized as we enter an era of input management within a field. A wide range of variable rate technologies allow for changing the rate of input application, seeding rate, planter down pressure, and pesticide applications across the field.

The primary metric (measure) that determines whether a technology has an economic Return-On-Investment (ROI) is harvest yield maps. Make time to maintain/replace yield monitoring systems on the combine.

Sulfur applications continue to support higher crop yield.

Many strip trials over the past two years have resulted in an economic ROI. The form of sulfur applied will make a significant difference with crop response. Elemental sulfur is water insoluble and is not plant-available. It is normally ground into a fine powder (to increase surface area) and pressed into pastilles (half-moon-shaped) so it can be blended with dry fertilizer. It must be oxidized by soil microbes, something that won't happen until sometime in June making it a poor choice if to be used for the 2020 crop.

Common sulfate-Sulfur containing fertilizers include Ammonium Thiosulfate (ATS), Ammonium Sulfate (AMS), Calcium Sulfate (Gypsum) and Micro-Essentials MES-10 (50% elemental S and 50% sulfate-sulfur). Need help with setting up the trial or sourcing sulfur fertilizer? Sulfate-Sulfur is water soluble. If possible, avoid making applications to frozen and/or snow-covered soils unless applications are made to an existing crop, such as winter wheat.

It is time to test for crop response to zinc and boron.

N-TRACKER Plus has renewed an interest in testing for crop response to both zinc and boron. Samples collected at both 0-1 and 1-2 feet were tested for all common nutrients over the past two years. Frequently, the concentration of both zinc and boron was below what is considered adequate. Tissue analysis was added to N-TRACKER Plus in 2019. The combination of nutrient concentration in the upper soil profile and tissue analysis at V4 and VT validated the need to investigate crop response possibilities with both nutrients.

Does every farmer need to apply supplemental zinc and boron on every field? No. Should farmers be testing for crop response to these two micronutrients? Yes. Does form of nutrient applied and timing of application make a difference? Yes.

Designate a field for On-Farm Discovery.

Although the number of products that claim to improve harvest yield continues to grow, local data showing a consistent response is usually limited or nonexistent. Many products are supported by data collected from across the Midwest. Unfortunately, a field local to Central Iowa may not provide a good estimate of a field in East-Central Illinois. Take ownership of determining the value of new products by selecting a field that represents most of the soils in your operation and designate it as a place to test new products and/or practices.

Technology makes it relatively easy to apply treatments and your local Illini FS Crop Specialist will make it easy to create a trial design and locate product for treatments, help track crop response, whether it be scouting for treatment response on the ground or from the air (we have five drones and six pilots). On-Farm Discovery is focused on addressing your questions, in your fields, utilizing your data.

Variable rate N is on the horizon.

Data gathered by over 1000 N-TRACKER Sites over the past four years has provided confirmation of how variable plant-available N can be both between and within each cropping season. Whether determining residual N in the profile prior to the winter freeze, after the Spring thaw, or just before time for post-N applications, N-TRACKER Plus provides a good estimate of the soil's PAN status at a point-in-time.

The next cropping season will bring with it a new decade (2020) as well as a new approach to N management. Illini FS plans to test variable rate N applications based upon a 2 ½ acre grid samples collected to a depth of 2 feet and tested for both nitrate and ammonium-N. A variable rate recommendation will be generated based upon the amount of plant-available N detected at the time of sampling (pre-plant). If any significant rain events occur after sample collection, rates will be adjusted according to specific N-TRACKER Plus sites resampled with vulnerable areas of the field.

Will there be issues? Yes. Will there be more questions than answers? Yes. Regardless of the outcome, we plan to test the concept with plans for further expansion in 2021. No better way to learn than to do. The number of fields to try our new technique will be limited (2-5).