



PRIDE SEEDS

FEBRUARY 2022

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Soil Fertility for Corn

In December 2021, PRIDE Seeds sponsored the annual Farm Forum Event – Learn & Grow. During this event, John Heard, soil fertility extension specialist for Manitoba Agriculture, hosted a very informative Table Talk session focusing on soil fertility (nitrogen and phosphorus) for corn. This newsletter will focus on the main takeaways from his presentation regarding nitrogen and phosphorus fertility and 4R nutrient stewardship.

NITROGEN

Why you need it:

- Essential building block in plant proteins, genetic material and enzymes
- Vital for chlorophyll production
- Provides a boost to help plants grow rapidly

Signs of deficiency:

- Yellowing of lower leaves starting at the leaf tip and moving down the mid-rib (plant mobile nutrient)
- Poor plant growth and spindly stalks
- Delayed maturity
- Yield reduction

Optimum nitrogen (N) rates for corn range from 150-190lbs/ac in Manitoba. Corn has a remarkably high response to N; meaning the more nitrogen you put down, generally results in higher yield. This N response can allow room for profitability, even with inflated fertilizer prices.

What about the dry 2021 conditions?

During normal growing conditions (normal rainfall amounts, moist soil conditions), N is released efficiently via mineralization (thanks to bacteria in the soil). This N is available for plant use and contributes to overall yield. However, in 2021 conditions were particularly dry and therefore overall N use efficiency was reduced. Less mineralization occurred resulting in reduced mass flow of nitrate (plant available N) to the roots.

Under normal growing conditions, 1 pound of actual N produces 1 bushel of grain corn. However, during 2021 it is estimated that the corn planted required closer to 1.5 pounds of actual N to produce 1 per bushel of grain corn, due to the reduced nitrogen efficiency.

Did your corn use up everything you put down last year?

Residual N tests following corn harvest are an effective tool to use to know if your corn had sufficient N and determine what's left over. Measuring residual N in the top 24 inches of soil, John and his team concluded that:

- <20 lb residual N/ac - crop was probably under fertilized/deficient
- 20-50 lbs residual N/ac - crop was not excessively fertilized and met the yield potential
- >50 lbs residual N/ac - excess N available

During the fall of 2021, John saw high levels of residual N in fields, especially in the areas with less rainfall and more severe drought conditions. Approximately 25% of the corn fields tested had greater than 100lbs of residual N in the top 24 inches of soil.

PHOSPHORUS

Why you need it:

- Aids in plant growth, maturity and seed development
- Assists in energy transfer
- Helps in the formations of metabolites (oils, starches, etc.)

Signs of deficiency:

- Poor growth, delayed maturity and restricted root growth
- Leaves may be dark green due to high levels of nitrogen taken up by the plant
- Plant looks like it has run out of steam and has no energy

Banding phosphorus (P) fertilizer or placing it with the seed is very crucial to achieving a good corn crop in any year because plant available P is immobile in the soil. So, an application in a concentrated band reduces the likelihood of it precipitating in the soil as there is reduced surface area exposed. Banding P fertilizer is not as common in Western Canada as it is in Eastern Canada, as many planters are not sold with the capabilities to do so. Although there are many options available to modify planters, broadcasting is still a very popular method. If broadcasting P fertilizer, keep in mind that it requires about four times the amount of fertilizer and it can be lost in surface runoff and soil erosion. Starter P response can vary year-to-year based on soil moisture, temperature, crop vigour and corn hybrid.

4R Nutrient Stewardship

Due to the dry conditions in 2021, the 4R Nutrient Stewardship guiding principles (agronomic, environmental, and economic) are more important than ever. All principals are very critical right now as we are dealing with many high risks going into the 2022 season. One of these risks would be the cost of fertilizer, as well as its uncertain supply. Because of high fertilizer prices, we also run the risk of not purchasing enough and under fertilizing. This could lower our profit potential while crop prices are significantly higher than they have been in previous years.

By considering the right combination of each of the 4R's we can achieve responsible nutrient use and help lower risks going into 2022.

- **Right Source** – matches fertilizer type to crop needs
- **Right Rate** – matches amount of fertilizer to crop needs
- **Right Time** – makes nutrients available when the crop needs them
- **Right Place** – keeps nutrients where crops can use them

Additional Reading

- › For more information on the 4R nutrient stewardship visit: <https://nutrientstewardship.org/4rs/>
- › For more information, watch the full Table Talk at the link below: https://www.youtube.com/watch?v=F3kqAXeZ4_4