...from the Desk of Scott Schaffert P.Ag. CCA 4R

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Between the Rows

In This Issue

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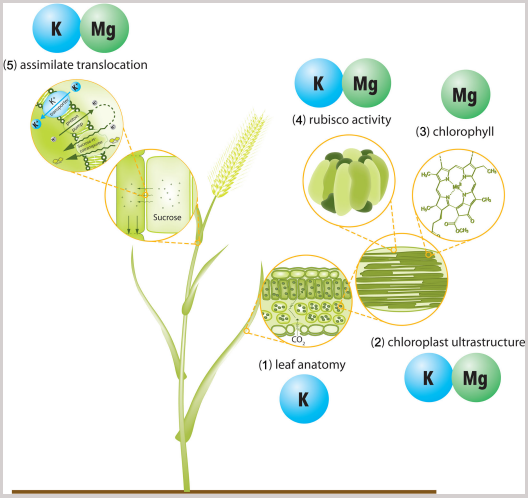
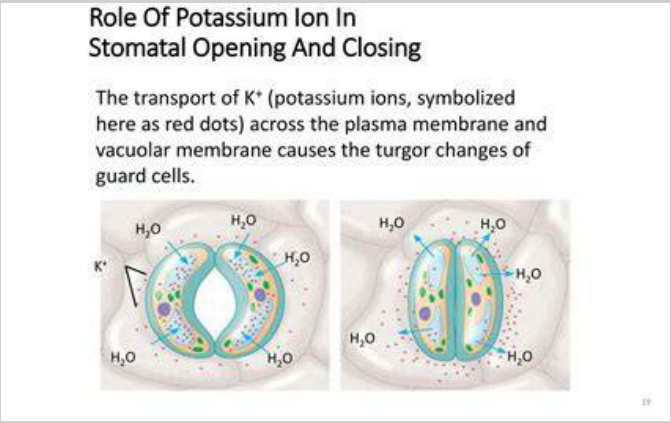
Potassium: Your Secret Weapon Against Stress

Potassium (K) has always been a bit of an unappreciated nutrient. When we take nutrients and fertilizer recommendation K has always taken a back seat to nitrogen and phosphorus. Nitrogen (N) always plays the big hero, with press and splashy yield responses in good growing conditions. No doubt N is extremely important, it's Batman. Phosphorus (P), with its important roles in critical growth functions and importance in genetic inheritance also gets tonnes of press, it's Robin. So, then we get to K. Often overlooked, K unlike N &P does not show huge yield responses and even in low soil levels, its deficiency symptoms are chalked up to herbicide injury or drought. But I am here to tell you that K is lot more important than people thought (even me 30 years ago). I am here to tell you that K is Thor.

Our soils were thought to have decent levels of potassium, after all we are next door to the world's largest supplier of potash, Saskatchewan. But in the last 10 years we have come to realize that our K levels are not that great and with our high Magnesium (Mg) levels, the K we do have is being interfered with by that Mg. So now we look at the ratio of K/Mg, something we did not even measure 10 years ago. The other major shift has been direct seeding. While the positives of direct seeding are vast, one issue is with immobile nutrients such as K. What happens is that when we place these immobile nutrients only 2" down, they get stranded there. When we get hot and dry in August uptake of nutrients is reduced and we lose our stress superhero, Thor.

So how does K help combat stresses. Plants combat heat and drought stress by opening and closing the stomata on the leaves. Stomata open when the plant is actively respiring to take in carbon dioxide and expel oxygen and heat. They close when the plant needs to conserve water. They open and close by the action of K+ cations that either diffuse into or out of the stomata guard cells (see diagram). Without adequate K, functionality of the stomata is reduced. The plant goes into full on stress-mode and the intricate system of water (and by extension nutrient) uptake is reduced. (continued on page 3)





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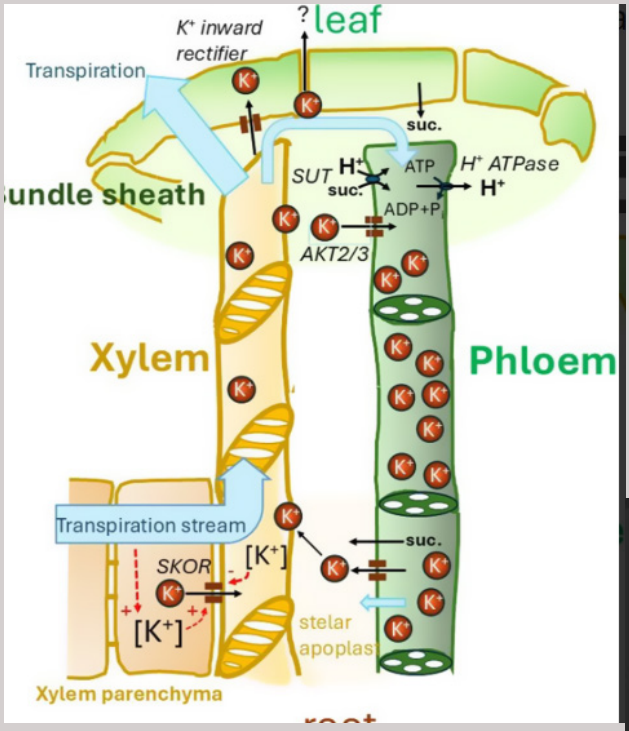
Potassium: Your Secret Weapon Against Stress...continued

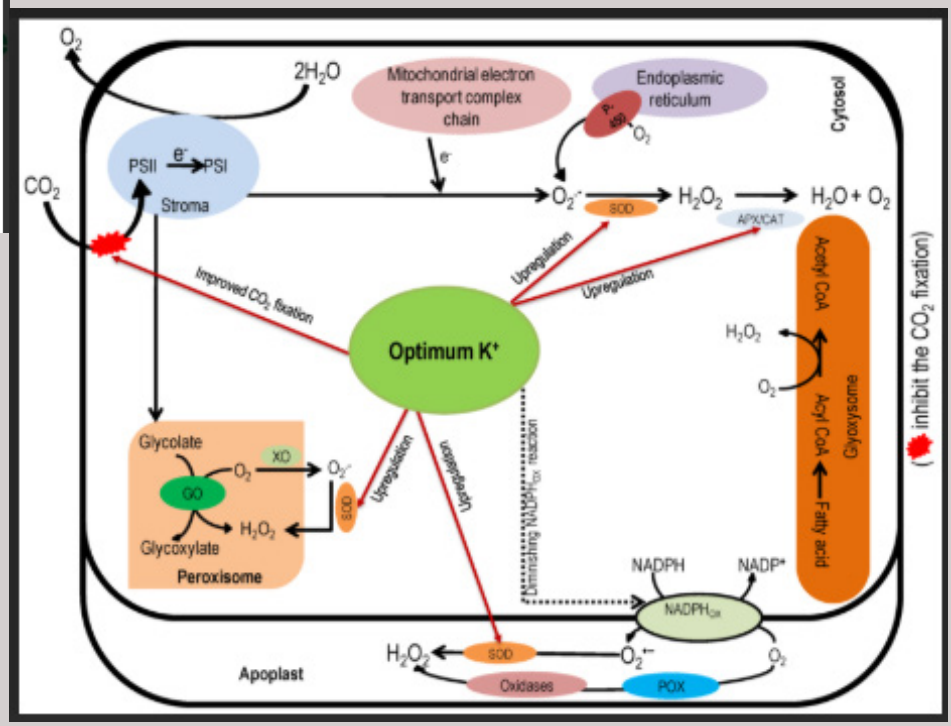
Another significant role for K involves the transport of sugars (carbohydrates) essential for roots and seeds. The K provides a mechanism for these compounds to enter the phloem. These compounds in the roots provide that soil mucilage that surrounds the roots hair, enhancing synergistic soil microbes. Which enhances nutrient water uptake. K also facilitates the movement of sugars into the stems. With adequate K, sugar storage in the stem will also thicken the stem reducing lodging. With deficient levels of K, these sugars are trapped in the leaves. The plant then senses the higher concentration of sugars in the leaves and shuts down photosynthesis. Meanwhile these sugar-rich leaves are a prime target for insects and disease that feed on these sugars. So by transporting the sugars out of the leaf, it reduces the potential for insect and disease stress.



While K is not a direct component of photosynthesis , it is involved in the activation of enzymes that are vital for the production of ATP.

Adequate K levels ensure that these significant processes are functioning, even is stressful conditions and also reduce the attractiveness of the plant to insects and diseases.

So I say let Thor protect your crop, keep your K up.



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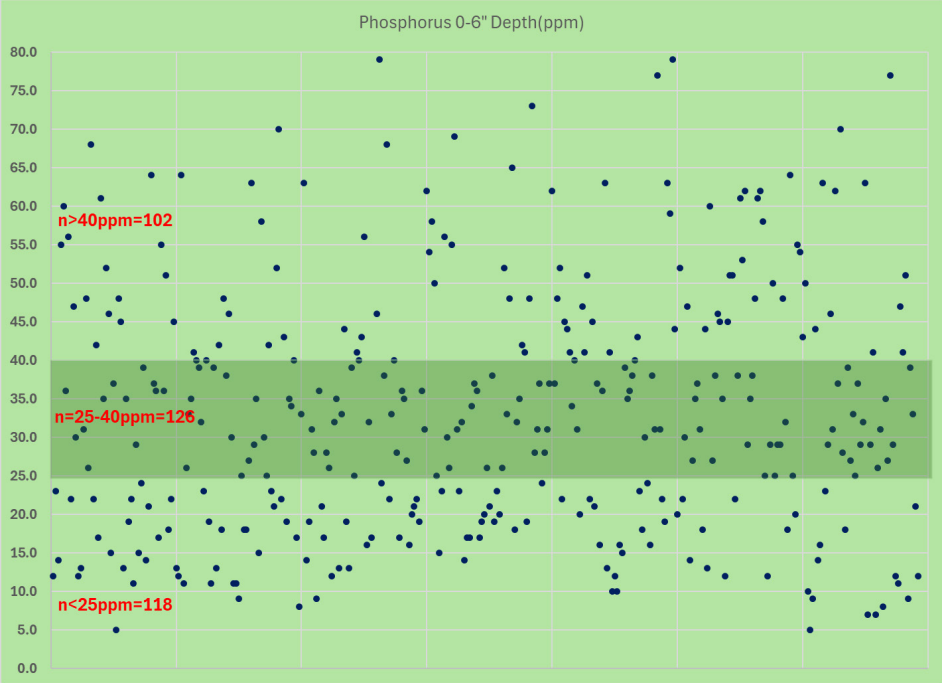
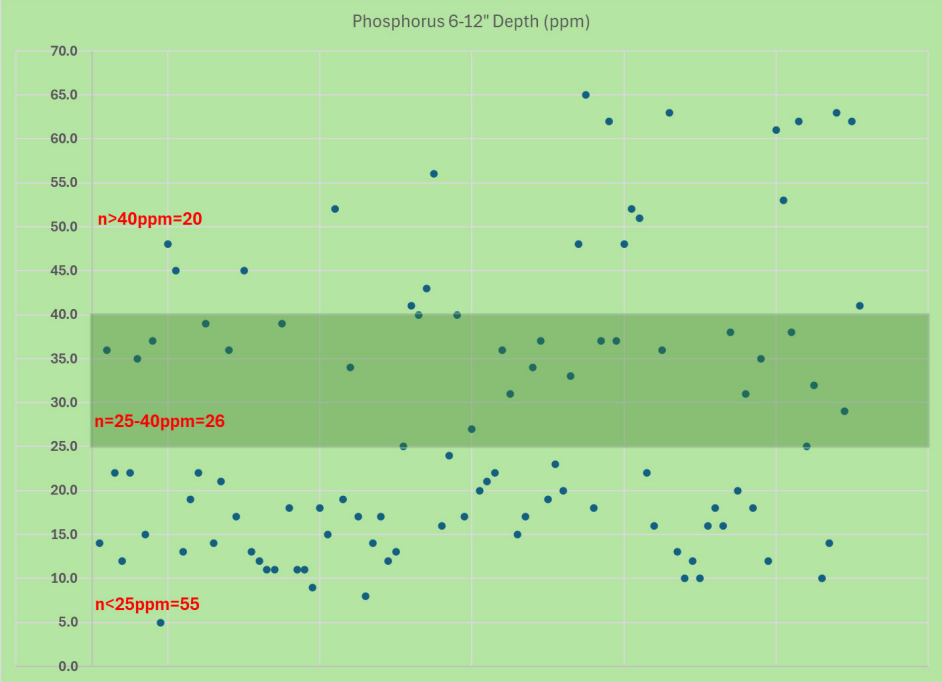
Soil Tests Deep Dive Part 4:
P & K: 0-6" vs 6-12"



This graph shows the Phosphorus results at 0-6" depth for 346 A&L soil tests. 102 tests (29%) have results above 40ppm. 126 (36%) are in the "sweet spot" of 25-40ppm. 118 (24%) of the samples are below 25ppm.

Keep these levels in mind, as we look at the 6-12" levels next.



This graph shows the Phosphorus results at 6-12" depth for 101 A&L soil tests. 20 tests (20%) of the results are above the 40ppm. 26 (26%) are in the "sweet spot" of 25-40ppm. 55 (54%) of the samples are below 25ppm.

When you compare the 0-6" and 6-12" P levels you can see the stratification of P in the top layer. I will discuss this further on page 6.

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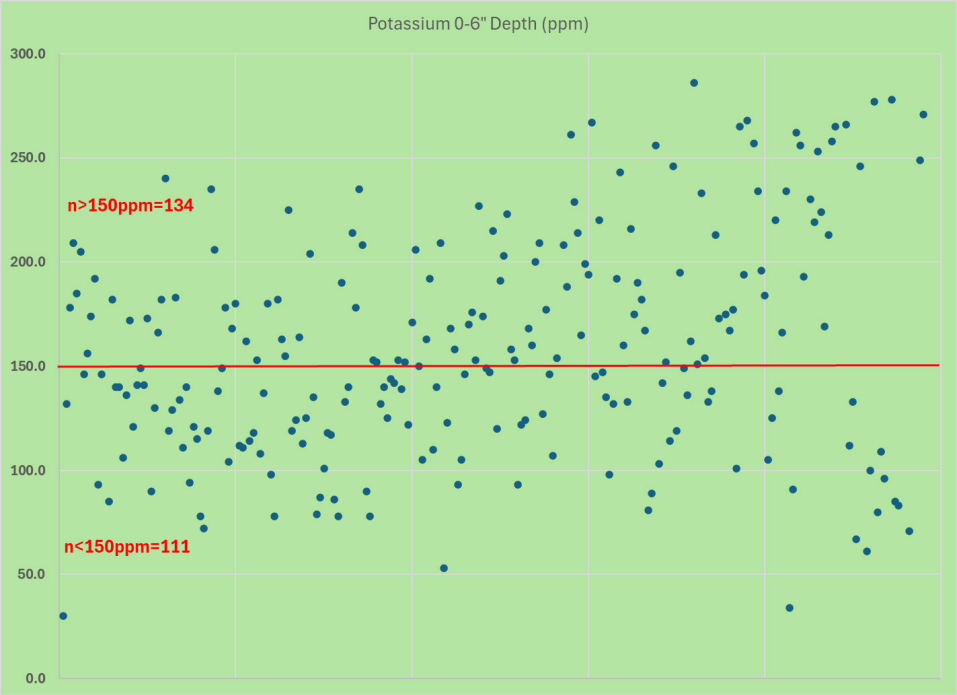
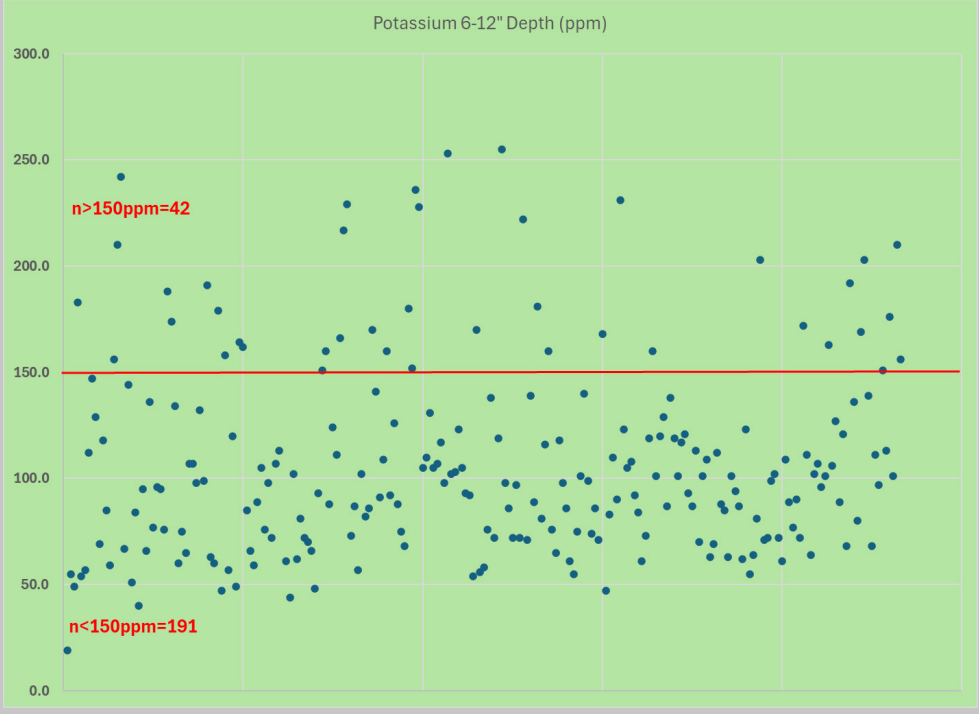


This graph shows potassium levels in ppm for 245 A&L soil tests. 134 samples (55%) had a K level above the recommended level of 150ppm. 111 (45%), had K levels below recommended levels.

Keep these levels in mind as we now look at the 6-12" results.



At the 6-12" depth only 42 (18%) of the results came in above 150ppm. 82% were below.

What these results show is a markedly reduction of potassium levels at soil depth. Why? See article on page 6.

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Stratification of Immobile Nutrients

As the deep dive into P&K levels from soil test results indicate, there is a significant drop in levels of both P&K at depth. While both are considered immobile, they are considered as such for different reasons.

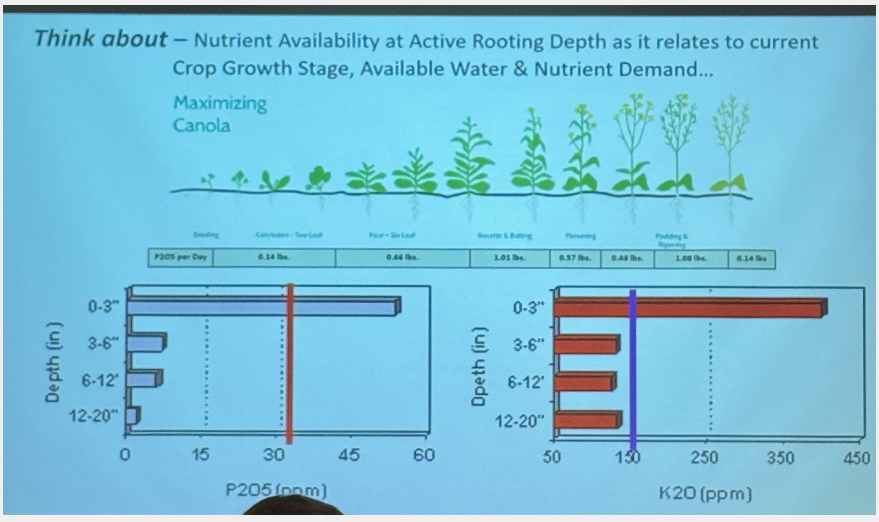
Phosphate (H_2PO_4-) carries a negative charge, so it doesn't bind to the negatively charged clay in the soil, meaning it should be mobile in the soil. It is however often bound with Ca (BTR 4.3), these bonds can be both readily (low pH) or slowly soluble (high pH) in the soil solution. Also in low pH soils phosphate binds very tightly to iron or aluminum and is unavailable. So generally phosphate is considered immobile, unless levels are so high they overcome the elements that tie it up.

Potassium (K^+) is a cation in the soil, meaning it has a positive charge. This positive charge allows it to be bound by the negatively charged clay particles in the soil. CEC is important here, the higher the CEC the greater capacity it has to hold on to K. As a cation it's availability is also tied to the balance of it and other cations (Base Saturation).

In the next Between the Rows, I'll examine how zero till has exacerbated the stratification of these two nutrients and possible strategies to rectify it.

Next Time in Between The Rows:

Nutrient Stratification and Zero Tillage
Late Spring? Strategies to Help
Testing your seed: Is it important?
Early Season Scouting
Rico's Riff
Farming is Fun



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Is Foliar Fertilizer an Option?

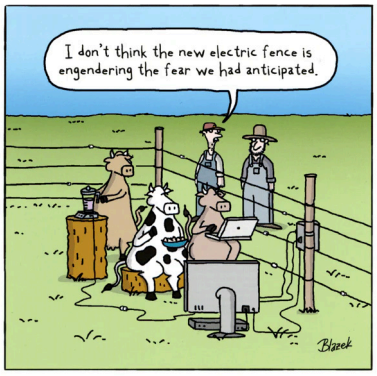
With the uncertainty of fertilizer supply and skyrocketing prices can foliar fertilizer be an option? Can I replace some or all of my granular fertilizer with foliar applied products?

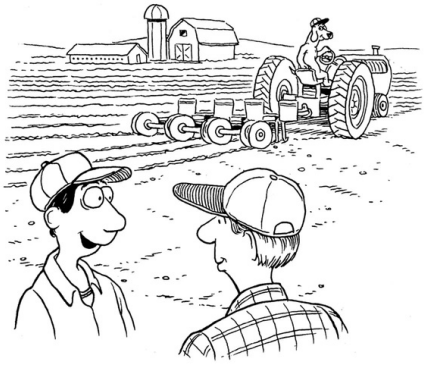
Foliar fertilization always appears as attractive solution to issues such as logistics, salt effects and high prices to granular products, and is often the best way to handle micronutients. However foliar fertilizers are not always the "silver bullet" they may appear to be. First off if your considering replacing some or all of your granular with foliar, you have to ask what nutrients the crop needs, when it needs at and how much. Then ask how much actual nutrient is in the foliar fertilizer, what rate can I safely apply and can I apply it when the crop needs it most.

To accurately determine what your crop needs, you **must** soil test. If you don't know what your soil has, how can you determine what you need to add. I also recommend soil testing regularly to monitor nutrient levels. I also recommend tissue testing, which is essentially your in-season report card that shows how your nutrient plan is performing.

Seeking the advice of a Professional Agrologist is also a good idea. As a P.Ag. I can guide you through the season and help you realize your yield goals.

Farming is Fun





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