

“Kicking the Dirt”

2018 Southwest Wisconsin Agronomy Update

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 11/26/2018

For the second year in row we've seen some excellent yields across southern Wisconsin for both corn and soybeans. With soil sampling for the most part starting to wrap up across the area, it's very important that we adjust our removal rates accordingly to ensure our phosphorus and potassium soil test levels are in the optimum range for next years crop.

Nutrient Removal Rates in Grain Crops

With margins of today's commodity prices relatively small, producers must put a sharp pencil to every input to ensure they are getting the best bang for their buck or return on their investment. Since wrapping up with harvest, it's time to estimate the amount of nutrients that were removed by this years crop, particularly two of the three major nutrients: phosphorus (P), and potassium (K). You can find in the tables to the right specific yield levels of both corn and soybeans and the removal rates that are associated with those respective yields.

Maintenance of soil fertility levels requires an application of at least as much fertilizer as what was removed with crop that was harvested. For reference, corn removes 0.38 lb. P₂O₅ and 0.29 K₂O per bushel, while soybean removes 0.8 lb. P₂O₅ and 1.4 lb. K₂O per bushel. So for example: over two years, 200 bushel corn followed by 60 bushel soybeans would remove about 120 lb. P₂O₅ and 115 lb. K₂O per acre. These values are a very important piece to the puzzle when you're structuring your nutrient sufficiency or build and maintain fertilizer recommendations. I like to look at nutrient sufficiency recommendations and build and maintain recommendations in the following light-nutrient sufficiency focuses on feeding the crop while build and maintain recs focus on feeding the soil. Soil test results should also be apart of our decision making process for making P and K recommendations. The goal here would be not to fall below the "optimum" range. Table 2 describes the ranges and probability of yield responses producers could see by each soil test level for both P and K. As you would expect the largest probability of yield response resides in the very low and low categories.

Corn Yield (bu/ac)	P ₂ O ₅ Removal (#/ac)	K ₂ O Removal (#/ac)
100	38	29
150	57	44
200	76	58
250	95	73

Soybean Yield (bu/ac)	P ₂ O ₅ Removal	K ₂ O Removal
50	40	70
60	48	84
70	56	98
80	64	112

Table 1
 *University of Wisconsin A2809

Soil Test Level	Phosphorus (ppm)*	Potassium (ppm)	Probability of Yield Response
Very Low	0-9	0-69	> 90%
Low	10-15	70-100	60-90%
Optimum	16-20	101-130	30-60%
High	21-30	131-160	5-30%
Very High	31+	161+	<5%

Table 2
 *University of Wisconsin A2809



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Phosphorus (P) and Potassium (K)

So, why is maintaining adequate phosphorous (P) and potassium (K) levels so important? I'll start with (P), it is critical to the plant energy process as it converts solar radiation into energy and stores it as carbohydrates. It also promotes early root and shoot growth and also improves a plants tolerance to drought, disease, and heat stress. Potassium on the other hand plays a crucial role in water regulation and is the activator in essential enzyme reactions within the plant. This aids in photosynthesis and respiration as we all know are two major processes. Optimum (K) fertility also promotes stalk strength and plays a major role late season standability, which we all saw what a premium it was this Fall. As you can see in table 3, IPNI conducted a soil test survey in 2015 across the U.S. assessing the percent of samples testing below critical levels for both P and K. Wisconsin had a surprising 65% of their potassium samples test below critical levels and phosphorus was 48%. The take away from this data is simple, P and K fertilizer rates may not be keeping pace with higher nutrient removal rates, which are accompanied by increasing yields.

There were a couple of instances this year that I was involved in where nutrient deficiency was a key factor in poor crop performance, and when I asked the question of when was your last soil test the response was, "I don't remember." Now I realize that soil testing is another cost you have to account for in your operation and with the current commodity prices some folks try to trim where they can, but compared to the cost of fertilizers, soil testing is inexpensive and offers a good return on your investment. Testing every 2-4 years is recommended, with most folks falling into the every 3-4 year category. Regardless of which program you are using, whether it be nutrient sufficiency or build and maintain I like to follow these general rules of thumb:

- Always fertilize when soil test levels fall below the optimal range, the risk of yield loss is high and return on your fertilizer investment is greatest for low or very low testing soils.
- Avoid application on high testing soils, return on your fertilizer investment decreases as soil test levels increase.
- Consider looking into variable rate fertilizer if you aren't utilizing it currently.
- When in doubt, fertilize based on your crop removal rates.

Bottom line the management of P and K fertilizers is more important than ever, I encourage you to look at this as a long term investment and not just a one year expense when it comes to inputs.

Best Regards,
William Wynn, CCA

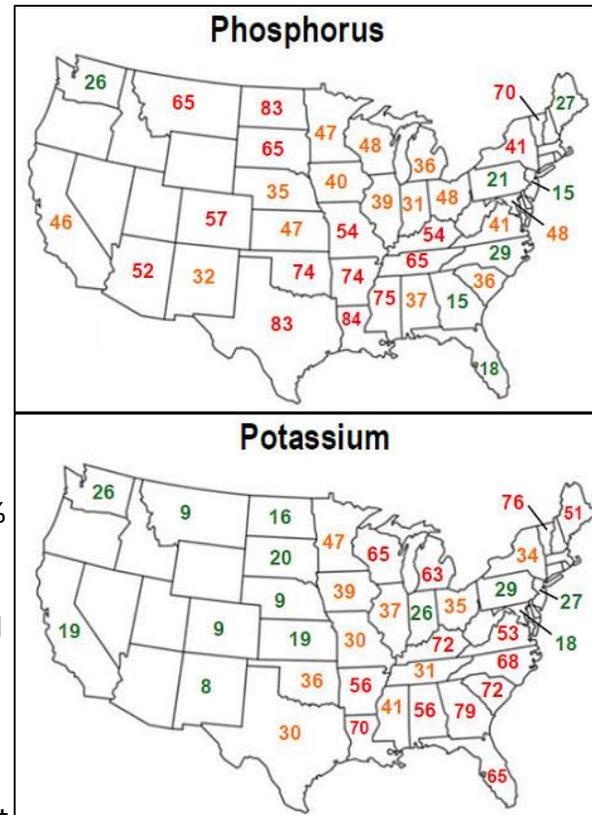
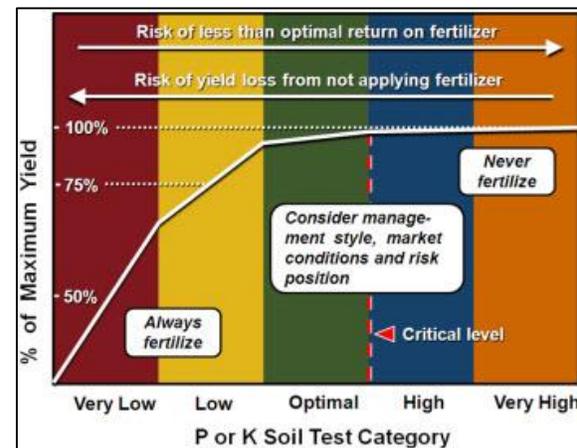


Table 3
*IPNI 2015 soil test survey



Warncke, et al., 2004



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