ARE YOUR FIELDS BEGGING FOR POTASSIUM?

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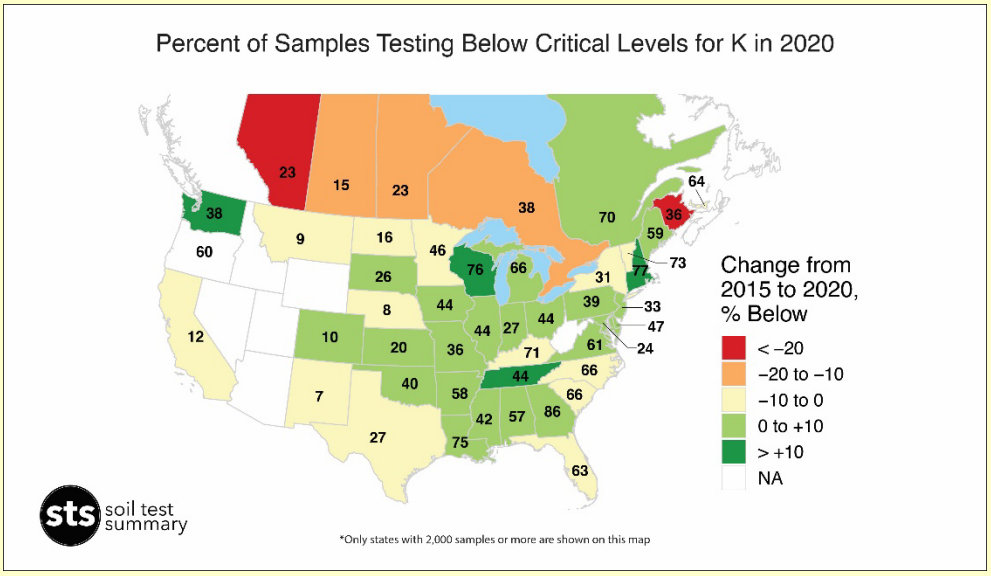

Data from the Fertilizer Institute show that many states average soil tests are critically low in potassium *(shown here).* This is especially true for states that produce a lot of forage. Corn yielding 200 bushels per acre and 60-bushel soybean crops remove about 60 pounds of K_2O per acre. If the same corn crop is harvested as silage about 240 pounds of K_2O is removed. Four times more K removal. This magnification of extra potassium removal for forage is much greater for potassium than it is for phosphorus. Like corn silage, four-ton dry matter yield alfalfa also removes about 240 pounds of K_2O (Wisconsin Nutrient Management Fast Facts Magazine 2024; Wisconsin Extension Crops and Soils Program). The Fertilizer Institute summarized soil test numbers and found in Wisconsin, as an example, 76% of submitted soil samples were below critical levels of potassium, down over 10 units from 2000. In many fields potassium levels are very low and getting lower. Low soil K also affects the efficiency of nitrogen utilization. Protein is nitrogen, so in addition to yield loss, low potassium may be affecting protein levels in forages. Low potassium levels also affect stand longevity of perennial crops such as alfalfa.

In livestock operations, manure returning to the field may nearly match the rate of removal of K from the silage harvested. It is a good, but not perfect, match. Doing math, having actual tests of the liquid manure, you'll often find that while phosphorus levels build, potassium levels deplete. If manure levels are limited in order to hold or lower phosphorus levels, potassium levels will typically drop unless additional potassium is applied. On farms where maximum forage production is achieved, the removal of potassium can be rapid. Many farms are now double cropping a winter cereal to harvest more forage per acre. This additional forage crop typically removes as much potassium as a full season normal grain crop of corn or soybeans.

If no manure is applied, 400-600 pounds of 0-0-60, or equivalent, is needed to simply maintain the potassium level depending on yield. The price of potash fluctuates. Recently, many producers found themselves facing low soil potassium levels and high potash prices. Therefore, when potassium prices moderate fertility programs should not only maintain but also build soil potassium levels. Droughts, wet spells, and soil clay levels may alter the soil potassium test, but too often producers avoid applying potassium while trying to get the soil to release the potassium it holds as unavailable. Yes, soil mineralization of potassium is possible, but it is also unpredictable, while the amount removed from forage harvest is undeniable.

Wisconsin Nutrient Fast Facts Magazine also contains this gem: *"6— Forage from fields with excessively high K level: Test forage for excessive K levels (> 3%) to prevent increased incidence of milk fever and other related illnesses in cattle."*

Sometimes producing low potassium forage is considered to protect fresh cows from having milk fever at calving time. It takes a long time to take a field with adequate to high potassium and convert it to a field that is low enough in K to produce low potassium forage. While doing this the yield on the field will also drop. As land becomes more valuable, can you afford to intentionally create poorly performing fields? There are other more reliable ways to protect against milk fever, and they can be used in conjunction with forage testing to provide safe rations for transition cows. You can reliably balance for dietary Cation-Anion Difference (DCAD) by using anionic products in the diet. These can achieve stronger DCAD effects than low K forages alone. Also, when using DCAD products, a separate segregated inventory forage used just by the transition cows is no longer needed. There are other products as well. Zeolite A is a calcium binder that has been shown to be effective in preventing milk fever. These products do make for more expensive rations, but they are fed for only a few weeks in the cow's lactation cycle and are inexpensive if you account for more effective control of transition time metabolic disorders and higher total lactation production. The extra cost will save you money in the long run. Then we add the higher yield from a field adequate in potassium and the ease of managing fields and inventories by not producing low potassium forages is an additional benefit.

Lactating cows generally benefit from ***higher*** levels of potassium in the ration - yet another reason to get the soil potassium soil test at least to optimum.

Finally, we often hear of luxury consumption of potassium. This should be found in high forage test or tissue test levels of potassium in forages.

Figure 2. K levels in forage samples. Courtesy Rock River Labs, data from the Midwest since 2018.

Feed Type	N	p15	Mean	p85	StDev
Corn Silage	193,845	0.738	0.909	1.067	0.176
Grass Hay	17,740	1.058	1.734	2.385	0.680
Legume Silage	102,228	2.146	2.604	3.051	0.464
Non-Legume Haylage	37,399	1.863	2.459	3.029	0.592
Other	35,230	1.660	2.176	2.670	0.527

In the example of Grass Hay, which shows a broad range of fertility management practices, the potassium level increases significantly—doubling from the 15th percentile to the 85th percentile. Additionally, it's worth noting the elevated potassium levels found in legume silages. What stands out in this dataset is that many forages are grown under conditions that severely limit potassium availability. On farms with high potassium levels (potentially excessive), if the forage is being returned to the field as manure, is there a potential issue?

While concentrates fed to cows are typically low in potassium, the high potassium levels in forages are beneficial for lactating cows. However, selling forages with excessively high potassium may be wasteful, as it might not always be necessary. That said, maintaining appropriate potassium levels in forages supports various factors such as ration potassium balance, stand longevity, and nitrogen-protein development, all of which benefit from proper potassium concentrations.

Soil tests, forage samples, and lactating cow rations all make the case that too many err on the side of too little instead of too much soil applied potassium fertilizer.