



## ***Potassium***

*4/22/2014*

Of the 17 essential elements for plant growth, potassium may rank only behind nitrogen as problematic to manage. Potassium gets trapped in clay and is slow to equalize into the soil solution. We need wetting of clay particles to expand the clay and allow exit of potassium into solution where plant roots can intercept it. Potassium deficiencies are a common problem during droughts.

But the issue goes deeper. For decades potassium chloride has been the potassium source of choice. It is the cheapest source and often times it provides beneficial crop responses. BUT, if you know AgriEnergy Resources' history you have heard the story of over-applying potassium chloride and destroying soil tilth on Muscatine silt loam soil – one of the most productive soil types in the world.

Potassium chloride can be particularly hard on soil flocculation. More correctly, potassium causes dispersion of clays. (The reverse of flocculation, dispersion means your soil runs together and becomes hard and compacted, with a reduction of tilth.) Deep pit hog manure, which is high in potassium, also hardens soil. As this University of Arizona chart shows, potassium is nearly equal with sodium at causing dispersion.

# Flocculating Cations

- We can divide cations into two categories
  - Poor flocculators
    - Sodium
  - Good flocculators
    - Calcium
    - Magnesium

Ion		Relative Flocculating Power
Sodium	Na <sup>+</sup>	1.0
Potassium	K <sup>+</sup>	1.7
Magnesium	Mg <sup>2+</sup>	27.0
Calcium	Ca <sup>2+</sup>	43.0

Sumner and Naidu, 1998

The University of Arizona Cooperative Extension

This winter we had the opportunity to have Dr. Saeed Khan speak at two of our AgriEnergy seminars. Dr. Khan has summarized dozens of studies and observed negative soil effects with potassium chloride.

We have experienced as little as 100# of potassium chloride causing sand to become tighter. This past season we experienced 300# of potassium chloride applied in the fall not carrying the corn crop through the season. This was verified with tissue testing. By V-8 the tissue was deficient in potassium. Another field with 200# of potassium chloride applied at planting showed a deficiency in the tissue 30 days later. The efficiency of our potassium dollars are left wanting with potassium chloride.

So, if potassium is hard on my soil, don't use it, right? NO! If you are deficient in potassium you WILL NOT grow a whole crop. If you need potassium we guarantee potassium chloride will give you a positive crop response. But, we are saying there may be better, more efficient products and applications.

Dollar for dollar we have seen potassium sulfate work. If you have a reasonable budget for potassium chloride, then spending the same dollars to purchase considerably less potassium sulfate will achieve an equal or better crop response.

Banding liquid potassium such as potassium thiosulfate works, too. For years Ray Roettger has replaced dry potassium applications with planter and/or sidedress applications of liquid potassium with great success. We are using 5-10 gallons of liquid potassium and achieving top yields of corn and forage, with less cost. And, we have observed potassium soil test numbers rising with these liquid applications. Ask Ray about 250+ bushel corn on low organic matter clay soils!

Critical soil test levels:

- 3-7% base saturation depending on your cation exchange capacity
- 400 lbs/acre potassium on ammonium acetate test
- 200 lbs/acre potassium on Morgan test
- 80 lbs/acre potassium on water soluble test
- Have your calcium levels high enough to maintain tilth. You want to flocculate/open up those clay particles with calcium so your crop can access the potassium

If you need potassium, USE IT! DO NOT omit it because of the negatives. However, if you use potassium chloride consider a lime or pelleted lime application along with it. The potassium will still harm your tilth, but the calcium will buffer the damage. A highly soluble calcium, like AgriEnergy's **Practi-Cal**, builds tilth.

Most of us in the Corn Belt east of Nebraska use potassium fertilizers every year. They are not all created equal in crop performance and soil impact.

**Potassium chloride** fits best on soils with abundant organic matter and adequate calcium. These soils are very resistant to compaction and hardening.

**Potassium sulfate** works very well across all soil types.

**Banding liquid potassium** is very efficient in pounds and dollars. To be kind to your soil, and pocketbook, consider liquid potassium in bands.

***Give your AgriEnergy Resources representative a call to discuss the best potassium option for your farm!***