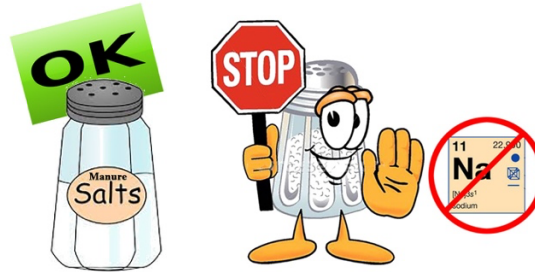


Understanding Manure Salts

Are the salts contained in a manure slurry good or bad?



Salt content in a manure slurry is often considered extremely bad and undesirable to have on agriculture land. Are all salts bad? Which salts are bad for crop fertility and yield? What are the salt limits for manure application? How do you remedy Sodic Soils?

Definition of Salt

The chemical definition of a salt is the pH neutralization of an acid by a base. In a manure slurry it is the neutralization of a *Cation* with an *Anion*. When the positive ions and negative ions are combined, they are called compounds. Manure salts or ionic compounds are generally water soluble and are prevalent in a manure slurry.

The *Cations*, or the positive charged ions, in manure salts are: Ammonium (NH_4), Potassium (K), Calcium (Ca), Magnesium (Mg_2) and Sodium (Na).

The *Anions*, or the negatively charged ions, in manure salts are Nitrates (NO_3), Sulfate (SO_4), Bi Carbonate (HCO_3), Phosphorus (P), and Chloride (Cl)

Type of Manure Salts

The salts in a manure slurry are NH_4SO_3 , NH_4SO_4 , NH_4NO_3 , P_2O_5 , K_2O , MgHCO_3 , MgSO_4 , CaHCO_3 , CaSO_4 and NaCl. Most of these salts are water soluble and are measured by the SAR – Sodium Absorption Rate or the EC – Electrical Conductivity on a lab report. But the critical number is the not the SAR or the EC, but the pounds of Sodium in the manure slurry.

Are all Manure Salts Bad?

We typically think of all salts as table salt or NaCl; this type of salt is bad due to the Sodium content. You will find Sodium of various levels in a manure slurry. You should check the lab reports to determine the Sodium levels and then let that moderate your application rates.

As a result, *Manure Salts* generally get a bad reputation, but not all these salts are detrimental to plant fertility or crop yield. In fact, all of your N-P-K nutrients are delivered in the form of ion neutral manure salts. The N-P-K nutrients are vital to a plant's growth; these N-P-K neutralized ions (or salts) in manure slurries are okay.

Ionic salt compounds, such as $(\text{NH}_4)_2\text{SO}_3$, $(\text{NH}_4)_2\text{SO}_4$, NH_4NO_3 , P_2O_5 , K_2O , MgHCO_3 , MgSO_4 , CaHCO_3 , CaSO_4 are generally not problematic for crop production or yield.

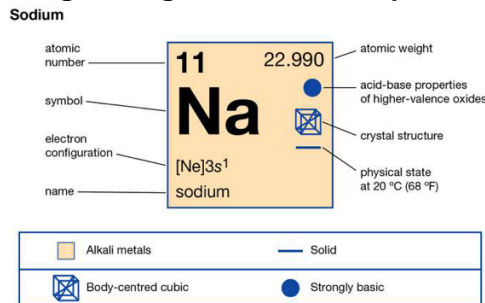
Sodium is the Culprit

The offending ion is Sodium (Na). This is the ion that blocks the capillary action of water within the soil. Without water a plant does not do well, and you will find the plant leaf's turning brown.

Sodium is the element that is detrimental to crop fertility, growth and crop yield. Excess Sodium should be avoided if at all possible. However, Sodium levels of less than 500 pounds per acre per year can be handled, especially if you have rain or sodium free irrigation water.

If you have heavy clay soils or tight soils, then Sodium can be a bigger problem. This is because the water cannot leach the Sodium down to soil depths that are below the normal root zone of the crop.

With too much Sodium (NaCl) in the soil it will result in the reduction of crop yield. When the levels of Sodium start getting too high in the soil, they call that Sodic Soil.



How much Salt is too Much?

When looking at the soluble salts some farmers get concerned by a high SAR or EC number or the total pounds of soluble salts. Generally, a manure application is not the offending addition of Sodium; it is usually irrigation water with high Sodium content that will cause the problem.

The generally accepted levels of salt application per acre per year are:

Sodium < 500 pounds per acre per year;

Total soluble salts <5000 pounds per acre per year

Remediation for Sodic Soils

When Sodium levels in the soil reach 8% to 10% you will start to see reduction in crop yields. When this happens, you need to amend the soil to mitigate the adverse effects of the Sodium. Take *Soil Samples* of your fields to check the residual levels of N-P-K and Sodium.

Typical remediation is the application of Gypsum at the rate of 500-2000 pounds per acre. When you have crusting of the soil, water will tend to run off rather than soak in. If this is the case, you will need to amend the soil with the addition of Sulfur. This will make your soils soft and will allow rain and irrigation water to penetrate and be more available for your crops.

References:

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