

---

May 9, 2014

## SALINE COUNTY CAN BE SALINE

The name Saline County, signifying salt, was applied to the county from a thought of early pioneers that somewhere, within our boundaries, were to be found numerous extensive salt springs. This, of course, proved untrue. However, today well drillers and landowners from Wilber to DeWitt to Swanton deal with salt in groundwater, so maybe the county is rightfully named. Two years ago a new well developed west of Wilber was found to be the saltiest irrigation well ever tested in the history of Ward Laboratory in Kearney, NE. That's the kind of report you don't want to see after the new well had already been developed. The well was abandoned and a shallower irrigation well was dug with much better water quality, at least for now.

From the youngest to oldest, the kinds of bedrock underlying our soils in Saline County are the Carlile shale, Greenhorn limestone, Graneros shale, Dakota sandstone and Permian limestone and shale. The Carlile, Greenhorn and Graneros formations yield little or no water to groundwater wells. Where we run into trouble is in the Southeast part of Saline County with highly mineralized groundwater in the Dakota formation. You want to stay above that formation with irrigation test holes. The Dakota rocks consist of interbedded shale and sandstone which generally yield highly mineralized water or salt water. Near Friend and Dorchester this formation is very deep in the ground and above it you have thick sand and gravel areas that bear good quantities of irrigation water. The thickest layers of sand and gravel are in the northern third of the county and the extreme southern part.

Too much salt in the irrigation water effects plants in two ways. It prevents the crop from getting enough water, even when the soil is wet, and it has a direct toxic effect on the plant. Too much salt in the soil can cause large crop losses until it leaches out of the profile.

Sodium, a salt constituent, is a cation (pronounced "cat" ion). Cations are very small positively charged particles that are attracted to negatively charged soil particles. Other cations include calcium and magnesium. Too much sodium exchange in the soil causes soil structure problems, soil clods when tilled and soils tend to "seal off." This dispersion results in breakdown of soil aggregates and causes the soil to become hard and compact when dry and increasingly impervious to water penetration. Too much sodium in the soil can cause large crop losses and requires soil amendments like gypsum (calcium sulfate) to amend the soil and leach the sodium away with rainfall. Sometimes the risk and cost is too great to attempt using the water.

The sodium hazard of irrigation water is estimated by the sodium absorption ratio (SAR). This is the proportion of sodium to calcium plus magnesium in the water. The salt hazard of irrigation water or amount of soluble salts is generally estimated by determining its electrical conductivity.

Always figure out a way from the irrigation test hole to check for salt and sodium absorption ratio. If the well driller does not do this for you, you need to figure out a way to get a good sample. Make sure when testing your water, you have those two values or EC test and SAR test.

Last week, one irrigation test hole west of Wilber yielded good quality water and another test hole in the same section yielded very poor quality or high hazard salt and SAR numbers. We also had a test hole that was scored and ranked by the Lower Big Blue NRD that did not meet the new 200 point system criteria that takes into account depth of the aquifer, transmissivity based on the test hole report (gallons per day per foot), type of irrigation and number of registered wells in the vicinity. The LBBNRD new Groundwater Rules and Regulations do allow for variances to be applied for. Simply put, a prospective well permit applicant would need to complete the variance form, seek out and obtain written "Waivers of Liability" from neighbors and pay a \$100.00 fee.

Water in agriculture is our lifeblood. Developing new irrigation wells in partial aquifer areas or confined aquifer areas in the District is now more complex. The new ranking system is an attempt to manage or prevent future municipal, irrigation, livestock and domestic well interferences and reverse declining groundwater levels in certain areas of the District.

Randy Pryor, Extension Educator

University of Nebraska-Lincoln Extension in Saline County • 306 West 3<sup>rd</sup> Street, Wilber, NE 68465

Phone (402) 821-2151 • Fax (402) 821-3398 • e-mail: [randy.pryor@unl.edu](mailto:randy.pryor@unl.edu)



Extension is a Division of the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln cooperating with the Counties and the United States Department of Agriculture.

University of Nebraska-Lincoln Extension educational programs abide with the nondiscrimination policies of the University of Nebraska-Lincoln and the United States Department of Agriculture.