# SORGHUM - SOIL FERTILITY AND NUTRIENT MANAGEMENT

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Fertilizer and nutrient inputs are a key component of production costs, farmers should consider these points when making production plans.

*Test to determine your soil nutrient needs*. Before investing money in nitrogen, phosphorus, potassium, sulfur, or zinc, invest in good soil tests for these nutrients. Also, consider testing both the 0- to 6-inch surface soil and the 0- to 24-inch soil profile to improve the reliability for mobile nutrients such as nitrogen and sulfur. Nutrient levels vary from field to field, and in different areas of fields, so determine nutrient needs before investing in fertilizer. If the phosphorus soil test using the Mehlich 3 test exceeds 20 ppm and the potassium soil test level exceeds 130 ppm, the chances of an economic response to fertilizer in any given year is low.

*Nitrogen*. Nitrogen recommendations are strongly improved when the soil test nitrate-nitrogen level is considered. A profile soil test is probably the single most important thing a farmer can do to reduce fertilizer costs and maximize nitrogen use efficiency in corn. A profile soil sample is also valuable for estimating sulfur and chloride needs for sorghum in Kansas.

There are several tools available to help growers take advantage of nutrients stored in the soil and reduce fertilizer application. By incorporating these technologies in a nutrient-management program, Kansas farmers can minimize both input costs and any adverse effects on water supplies.

# How does sample handling practices effect soil test results?

Correct soil sampling in the field is often considered the most critical step for reliable soil test results. However proper handling of soil samples collected in the field until is processed in the lab can also influence some nutrient values.

To evaluate the effect of soil storage on soil nutrients, scoops of soil were placed in samples bags randomly. Half the sample bags were then placed in the fridge, the other half were placed in a cargo box in a pickup bed. Every two days, 3 samples were removed from both storage locations and analyzed in the lab.

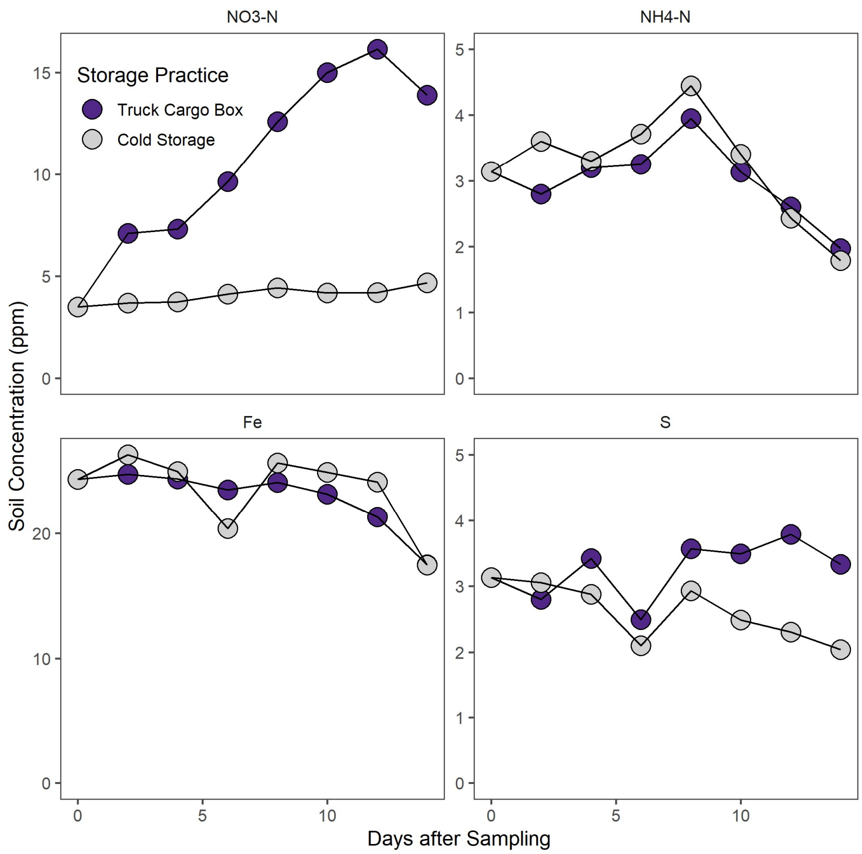


**Figure 1**. Change in soil test results over a two-week period. Results are shown for nitrate (N03-N, top left), ammonium (NH4-N, top right), iron (Fe, bottom left), and sulfur (S, bottom right).

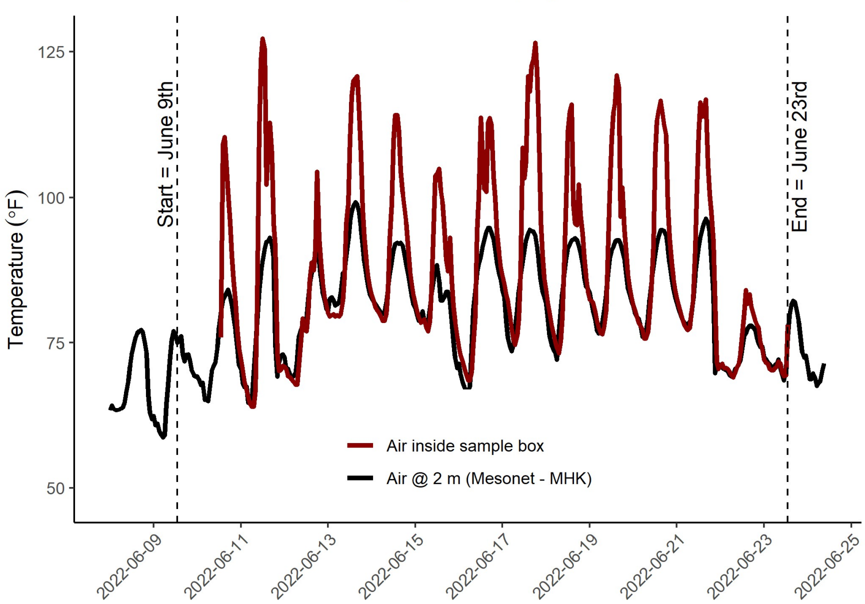


**Figure 2**. Air temperature inside a truck cargo box compared to the outside air temperature over the two-week incubation study. Air temperatures inside the cargo box where highly variable over the course of the experiment.

**Take Home Points**

- Soil test results are strongly affected by how we handle samples before lab analysis.
- Air temperatures inside truck cargo boxes can reach high temperatures quickly (Figure 2). Sample should not be stored for more than a couple hours.
- Soil test nitrogen was especially sensitive in this study. Profile-N increased from 20 lbs N/ac on Day 1, to over 100 lbs N/ac by Day 10 (Figure 1).
- Soil samples should be air-dried as soon as possible after collection, especially when nitrogen will be measured. If air-drying is not possible, place samples in a fridge with temperature < 40 F. Do not heat or freeze samples!

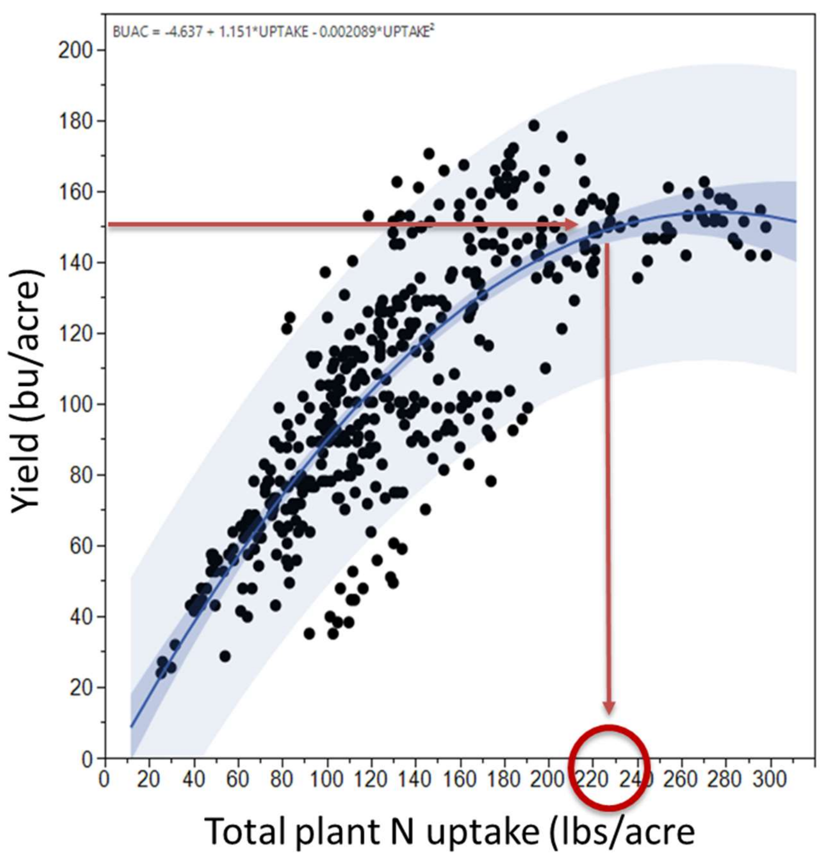


**Figure 11**. Nitrogen uptake in sorghum biomass, and grain yield.

Example: 150 bu ~ 230 lbs of N total uptake

- N from OM (2%)= 40 lbs
- Previous crop (soybean)= 40 lbs
- Some profile N?= 30 lbs

40 + 40 + 30 = 110 lbs of N from the soil

230 - 110=

~ 120 lbs of N from fertilizer

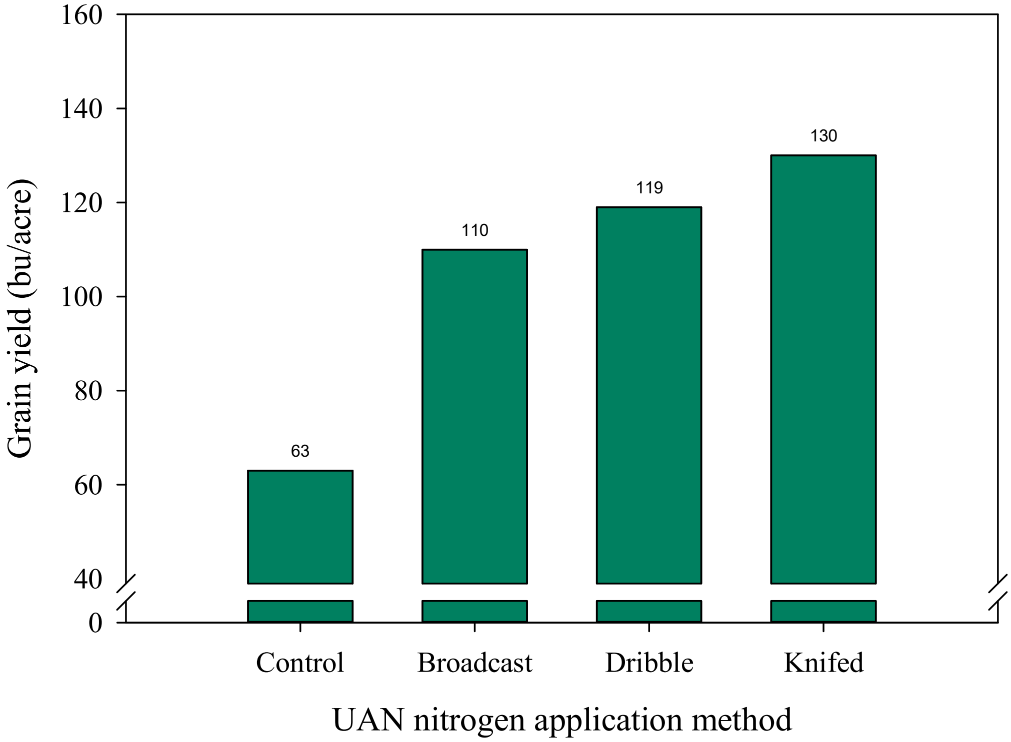


**Figure 12**. Nitrogen fertilizer placement in no-till sorghum, 90 lbs of N.

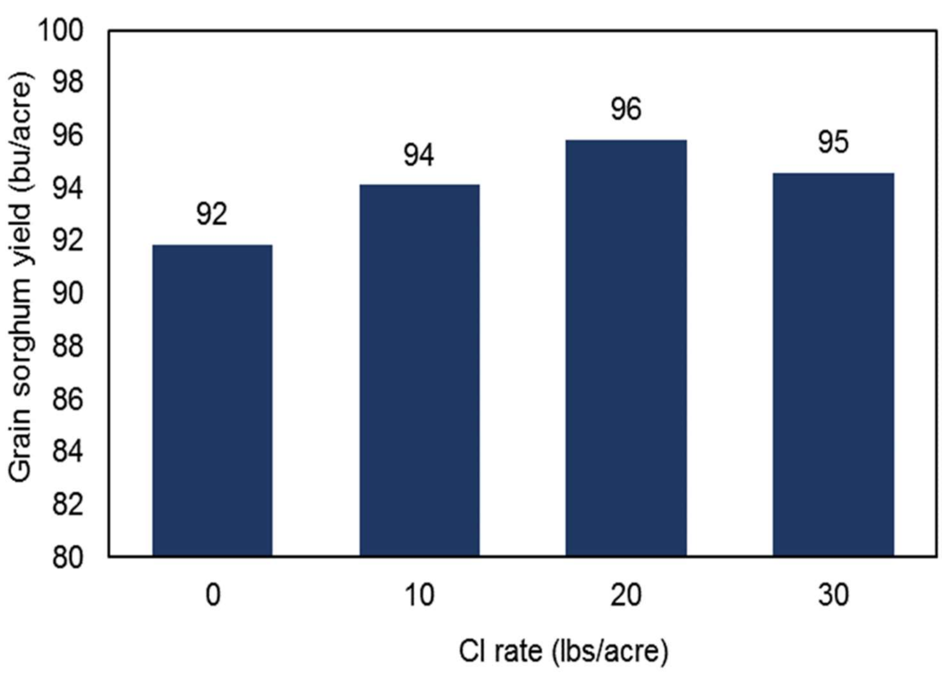


**Figure 13**. Sorghum grain yield with chloride across 16 locations.

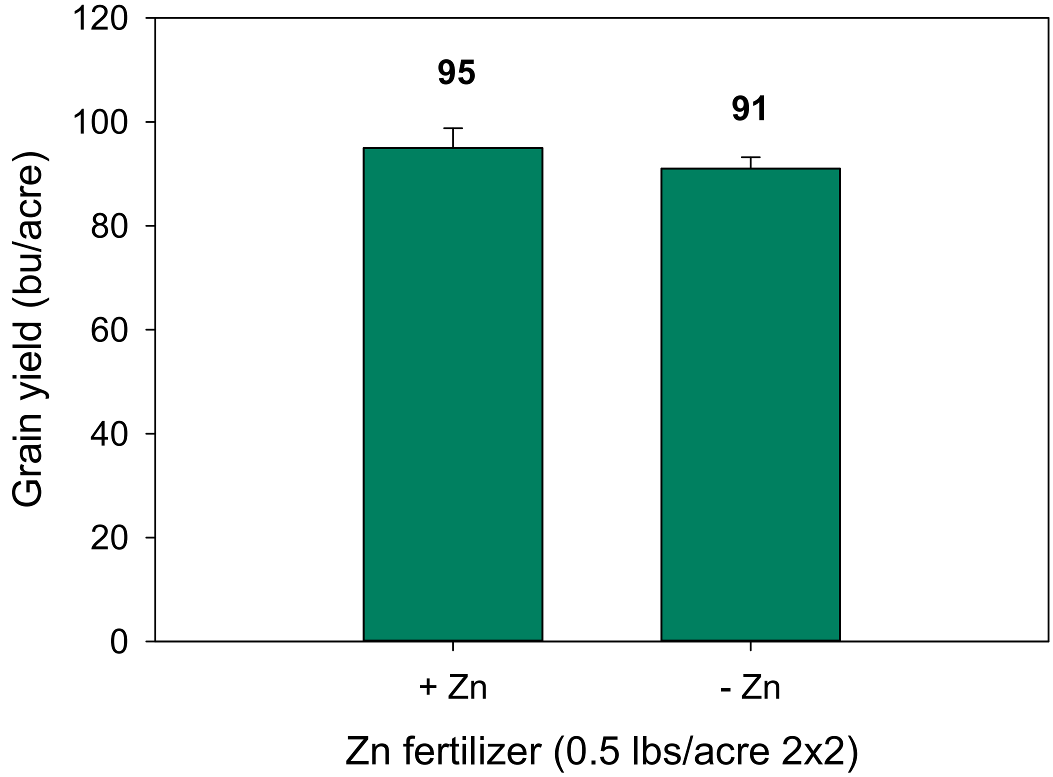


**Figure 14**. Sorghum yield with band-applied Zn. Soil test Zn (DTPA) 0.6 ppm

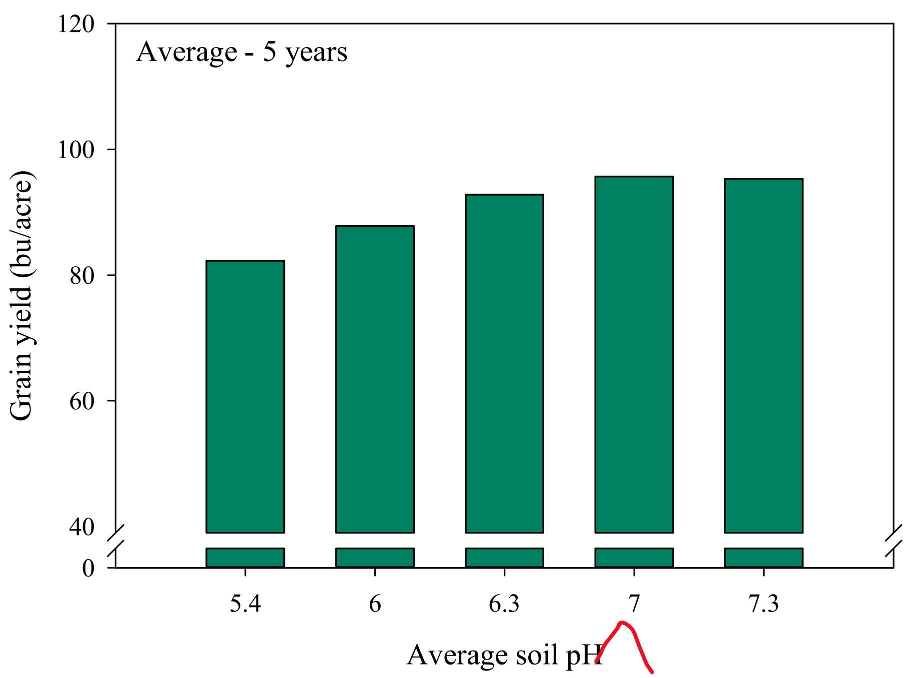


**Figure 15**. Sorghum and soil pH