

**PROTOCOL FOR ON-FARM RESEARCH –  
CORN RESPONSE TO SULFUR FERTILIZER IN WISCONSIN**

**Contact Information:**

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**Goal of the Research:**

Determine corn yield response to applied sulfur (S) in Wisconsin.

**Rationale:**

An increase in the number of reports of suspected S deficiency in corn recently may be related to the steady decline in atmospheric S inputs over the past several decades.

**1) Site Selection:**

- a) Previous crops: corn, soybean, alfalfa, vegetable crops, or small grains.
- b) Sites where manure or other organic S sources (e.g. biosolids) have been applied in the last three years can be used, but these sites may supply adequate S to meet corn demand. It is critical that you have precise quantitative information about the manure or other organic S sources (rates and lab analysis) in order to estimate S credits from these sources.
- c) Uniform soils typically used for corn production.
- d) All other nutrients (e.g. N, P, K, etc.) should be non-limiting.

**2) Experimental Design:**

- a) Randomized complete block design with at least three replications (See example plot diagram). Plot size is flexible. Harvested area must be the same in all replications.
- b) Treatments
  - i) S rate: 0 and 25 lb S/acre.

- ii) S sources: An example would be calcium sulfate (gypsum, 17% S) at 147 lb/a. If using municipal or industrial wastes (e.g. flue gas desulfurization gypsum), apply at the most practical rate nearest 25 lb S/acre.
  - (1) If ammonium sulfate or potassium sulfate is used, be sure that all treatments have the same total amount of N or K applied.
  - (2) Do not use elemental S.
- iii) Treatments can be applied prior to or after planting.

### **3) Soil & Plant Sampling:**

- a) Soil (required):
  - i) Routine soil test results (pH, organic matter, P, K, and SO<sub>4</sub>-S).
    - (1) Collect one sample consisting of at least 10 cores to a depth of 6 to 7 inches from each replication in the experiment (i.e. 3 samples total if 3 replications).
    - (2) Collect samples prior to S application.
- b) Corn Ear Leaf Sampling @ Tassel (VT) to Silk (R1) (optional but recommended):
  - i) Obtain 15 ear leaves (from primary ear) from representative plants in each plot.
  - ii) Samples should be placed in a labeled paper envelope/bag (not plastic). Brush off any contaminants from leaves including soil, dust, etc. and refrigerate until submitting to lab.
  - iii) NOTE: If there appears to be spatial variability within each plot, obtain samples from both “normal” and “abnormal” areas within each plot and collect a soil sample, which corresponds to those areas. If this occurs, please contact Carrie Laboski before harvesting. It may be desirable to harvest normal and abnormal areas separately.
- c) Contact Carrie Laboski for lab account information.

### **4) Yield Results (choose grain or silage):**

- a) Grain harvest methods.
  - i) Yield monitor (calibrated).
  - ii) Weigh wagon.
  - iii) Hand harvest (minimum of two 25-ft lengths of row).

- iv) For all methods, data must include yield (bu/acre at 15.5%) and % grain moisture for each plot.
- b) Silage harvest methods.
  - i) Truck weights
  - ii) Hand harvest (minimum of two 25-ft lengths of row).
    - (1) Weigh, run 10 to 15 plants through a chopper, take a subsample, weigh, dry, and reweigh.
  - iii) For all methods, data must include yield (ton/acre at 65%) for each plot.

## **5) Other Information**

- a) Site History:
  - i) Soil name and texture.
  - ii) Nearest city/town (for weather station information).
  - iii) Five-year crop and S rate/source history.
  - iv) Five-year manure history, application rates, and analysis.
- b) Current Year Management and Weather:
  - i) Tillage and surface residue cover after planting.
  - ii) Corn hybrid, relative maturity, planting date.
  - iii) Manure – application rates and lab analysis.
  - iv) Fertilizer S treatment application date, rates, placement.
  - v) Other fertilizers applied including starter, rate, analysis, and placement.
  - vi) Growing season weather conditions.

## **6) Data Collection File:**

- a) Complete the data collection Excel file. This file provides a template for all of the site information and yield data that is needed. The Excel file can be found at:  
<http://www.soils.wisc.edu/extension/onfarmdemo/>
- b) The data collection file should be named in the following manner: county-your name-year-S corn trial.xls (Example: Dane-Laboski-2012-S corn trial.xls)
- c) Email the completed data collection file to Carrie Laboski (laboski@wisc.edu) and Todd Andraski (andraski@wisc.edu)

**Example Plot Diagrams (S rates are randomized within each rep – flip a coin)**

Numbers within the diagram are S rates in lb S/a.

25	0	Rep 3
0	25	Rep 2
0	25	Rep 1

OR

0	25	0	25	25	0
Rep 1		Rep 2		Rep 3	