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.

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- 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 (<u>required</u>):
 - i) Routine soil test results (pH, organic matter, P, K, and SO₄-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).

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- 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)

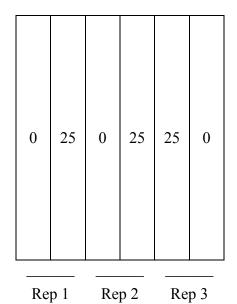
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Example Plot Diagrams (S rates are randomized within each rep – flip a coin)

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

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

OR



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Rep 3

Rep 1