Final report OSC **Project: #14-2-19**

Increasing Soybean Productivity while Improving Soil Quality and Mitigating Climate Change
Submitted by Randall Reeder, May 2015

This one-year project served as “bridge funding” to keep Ohio research and outreach ongoing during the third year of a 5-year USB project when USB could not fund us. This was successful because USB has funded our project for Year 4. And we are already preparing the USB proposal for completing the project in Year 5.

The research plots at Piketon and Hoytville were continued with all the proper crop rotations, soil amendments and management practices during the 2014 growing season. (Also, USDA-ARS maintained their similar plots in Indiana and Alabama.)

Educational activities

Our two Soybean fact sheets were displayed and available at the National No-Till Conference in Cincinnati, January 14-17, 2015, at the Conservation Tillage Conference, March 3-4, and the Ohio No-Till (spring) Field Day, April 1. At the National No-Till Conference I described briefly our soybean project during a breakout session with 45 people.

Our Facebook page has been kept up to date with frequent postings and additions (facebook.com/soybeanproductivity).

Several educational items are available free on the web page (fabe.osu.edu/soybeanproductivity). This report, an economic analysis of the 2014 crop year, and a Powerpoint (including the economic analysis) are on the webpage.

Soil analysis

Rafiq Islam, OSU South Centers, continues to analyze several important soil properties of the soybean plots at Piketon. A half-dozen are recorded monthly during the growing season. Hoytville soils are analyzed once a year.

Key points from a profitability analysis of the experimental data – 2014 (by Marvin Batte)

The full economic report of the 2014 crop year is 8 pages, including 5 tables. Here are some key points:

Soybean performance data for the various treatments and locations studied were used to represent the costs and returns for production under each of the treatment systems, and to calculate expected profitability of these systems for a commercial scale farm. We accomplished this by first estimating costs and returns for each production system at each of the four locations (Hoytville and Piketon in Ohio; and ARS research sites in Indiana and Alabama).

Receipts are limited to the market value of soybean crops harvested from the plots, expressed on a per acre basis. A soybean price of $10.25/bu was used for 2014 calculations. Production costs are based on soybean crop enterprise budgets developed at each of the state Land Grant universities in the three states studied, all assuming a no-till production system and based on a machinery set appropriate for a farm size of 2,000 cropped acres.

For plots receiving gypsum, a cost of $50 per ton of gypsum purchased and applied is charged. For cover crops, the cost of cover crop seed is charged, along with $4.50 per acre for a single pass with a no-till drill is levied. No difference in soybean seed costs were assumed for the high oil seed varieties. A cash rental charge, based on the 2014 USDA cash rental survey, is applied to represent the cost of land.

The regression coefficient for gypsum application was $-0.03 and was statistically significant ($P<0.01$). Thus, for 2014, each additional pound of gypsum applied resulted in a $0.03 reduction in per acre profitability, with location and all other treatment levels held constant. The estimated coefficient for cover crop was not significant at $P=0.10$, suggesting that use of a cover crop did not impact profitability in 2014. The estimated coefficient for the high oil variety was 38.53 (significant at $P<0.01$), indicating an average increase in per acre profitability of $38 per acre for the high oil variety used in this study relative to traditional soybean variety tested. Finally, the regression coefficient for continuous soybeans was -18.62 (significant at $P<0.10$), suggesting that continuous soybean plots earned nearly $19/acre lower profits than did soybeans following corn in 2014.

These results represent the combined experiences of the four test sites in 2014. It should be underscored that this represents only the third year experience with each of these treatments. One must be careful to draw conclusions from this short-term set of results. For instance, a survey of gypsum-using farmers conducted in 2014 by Batte and Forster found that these farmers observed yield increases for gypsum use on a number of crops, and that the magnitude of yield premium increased for farmers who had applied gypsum for four or more years. This may suggest that the gypsum use may display positive impacts in our own study as we continue the study over time. Likewise, we may see changes in magnitudes of other treatments (especially cover crops and continuous soybeans) as we track these over an extended study period.