ONE-PAGE BRIEF: Competitive Grant Reports XP2013-01 and XP2014-01

Impacts of conventional and diversified rotation systems on crop yields, profitability, soil functions, and environmental quality: Stage II

Results of this project contribute to a growing understanding of the performance characteristics of diversified cropping systems, including economic costs and returns, and basic biophysical processes like soil erosion and nutrient cycling.

What was done and why?

The project investigators sought to gain new information and assess additional performance indicators in the long-running cropping systems experiment at Iowa State University’s Marsden Farm in Boone County, Iowa. They estimated soil sheet and rill erosion potential and assessed soil nitrogen-related processes that can strongly influence crop productivity and environmental quality. They also quantified economic characteristics of the contrasting cropping systems.

During 2013 and 2014, the project focused on:

1. estimating sheet and rill erosion in the conventional and more diverse crop rotation systems;
2. measuring soil and plant parameters to learn if increased crop diversity maintained or improved corn nitrogen (N) uptake while reducing the amount of leachable inorganic nitrogen present in the soil;
3. assessing input costs and net returns for the different crop rotation systems; and
4. distributing results to farmers, agricultural professionals, extension personnel, scientists, and policy makers.

What did we learn?

Results indicate that diversified crop rotation systems (corn-soybean-oat plus red clover and corn-soybean-oat plus alfalfa-alfalfa) could reduce sheet and rill erosion substantially compared with a simpler corn-soybean rotation.

Findings from this project contribute to a growing understanding of the performance characteristics of diversified cropping systems, including economic costs and returns, and basic biophysical processes like soil erosion and nutrient cycling. The long-term nature of the Marsden Farm experiment and the consistency of results from it suggest that diversification of Iowa corn and soybean-based cropping systems with small grains and forages is a viable pathway toward reduced dependence on purchased agrichemicals, improved environmental quality, and maintenance of profitability.

This project was successful in extending information concerning economic results and other findings to a wide range of scientific, farm, and student audiences and readers.