Executive Summary

Demonstration of Integrated Conservation Tillage and Manure Management Systems for Corn-Soybeans Rotation – Hub and Spokes – Iowa State University

Tillage, nutrient and manure management have a significant impact on surface and groundwater quality, especially surface water runoff. In order to meet the designated criteria set by the TMDL rules for over 157 impaired water bodies in the state of Iowa, tillage and manure management must play a significant role. An integrated approach in development and adoption of best management practices for manure, nutrient, tillage, and crop residue management is essential. The major goal of this project is to demonstrate an integrated approach of tillage and manure management strategies on field-scale demonstrations utilizing the concept of the “Hub and Spokes” model.

At the Northeast Research Farm (Hub), evaluations of liquid swine manure and commercial fertilizer have been established over three tillage systems consisting of no-tillage, conventional tillage, and fall strip-tillage. Manure and commercial nitrogen fertilizer rates (0, 75, 150, and 225 lbs N/acre) were applied over each tillage system. The tillage and nitrogen rates were replicated three times. Ten cooperators established twelve on-farm demonstration sites (Spokes) to evaluate the effects of liquid swine manure rates on corn production, cost, and soil nutrient analysis. For each demonstration site manure applicators were calibrated to determine or check the application rates. Four rates of manure (0, ½ agronomic, full agronomic, and 1½ times the agronomic nitrogen rate pounds per acre) were applied at each demonstration site in three replications.

The results from both the on-farm demonstrations and the research farm show similar trends. Initial soil and manure analyses show significant variability within each site and between all sites. Late spring nitrate and fall stalk nitrate tests show a high dependence on manure management and application rates. Yield response to additional nitrogen and nitrogen source was affected by the site-specific history.

The outcome of this approach is very encouraging, over 850 producers and agriculture professionals participated in the educational programs of two field days, six workshops, and one winter meeting in 2002. When producers were asked about the importance of the Hub and Spokes project, the consensus was “it helps us fine-tune our management practices” and “the project gives an opportunity to increase manure management knowledge.” The cooperators stress the fact that the project provides “actual results, it’s exactly what happens at our fields” and “the information is site specific and readily available to us.” Seventy-one percent of the cooperators involved in this project have learned new skills or improved existing skills due to working with the project and 79 percent indicated they are managing their manure much more efficiently due to their involvement in this project.

By addressing tillage and manure management using an integrated approach, nitrogen utilization can be more efficient. An integrated approach that utilizes large scale field demonstrations and research size plots is essential in addressing manure and tillage management challenges. The ability to obtain results from on-farm trials and research plots that are consistent, will enable us to couple both concepts together to provide quality educational programs to producers and the agribusiness industry.