Impacts of 4R Nitrogen Management on Crop Production and Nitrate-Nitrogen Loss in Tile Drainage
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2014 Annual Interpretive Summary

In addition to local impacts on surface and groundwater quality, N and P loads from the U.S. Corn Belt are suspected as primary drivers of hypoxia in the Gulf of Mexico. Based on the need for nitrate-N reductions to meet water quality goals, new agricultural management practices are needed that have the potential to significantly reduce nitrate-N losses at minimal cost or even economic benefits to farm operations. This three year, field research and demonstration project is designed to evaluate various promising N management methods and technologies by documenting the nitrate-N in tile flow and crop yield from several practices and systems. The project is just getting under way, beginning on January 1, 2015 and running through December 31, 2017.

The objectives are to 1) determine the effects of N fertilizer application timing on nitrate-N leaching losses through tile flow; 2) determine the effects of N fertilizer application timing on crop yield; and 3) disseminate project findings through peer-reviewed journal articles, research farm reports, Extension and Outreach fact sheets and presentations, and other outlets as appropriate. Results will assist in the on-going review and adjustment of the Iowa Nutrient Reduction Strategy Science Assessment.

The study is located in northwest Iowa (O'Brien County). The site had a tile drainage system installed in 2013 on a field area with no previous tile drainage; with 32 individual subsurface drained plots for drainage water quantity and quality evaluation. In 2014, the site was uniformly cropped in preparation for treatment implementation for the 2015 growing season. A corn-soybean rotation (each phase of the rotation present each year), will receive the following treatments (with four replications): 1) no N; 2) fall-applied anhydrous ammonia with nitrapyrin (135 lb N/A); 3) spring-applied anhydrous ammonia (135 lb N/A); and 4) sidedress N application with 40 lb N/A as urea ammonium nitrate (UAN) at planting, plus an in-season adjusted rate. In 2014, all tile-flow monitoring equipment was installed on all plots and are ready for monitoring in the spring. An early freeze prevented the planned late-fall 2014 anhydrous ammonia application treatment. The project team is ready for anhydrous application once the weather conditions allow. Tile flow monitoring will begin as soon as tile flow commences in 2015.