Nutri-Net: Coordinated Site Network for Studying the Impacts of 4R Nutrient Management on Crop Production and Nutrient Loss

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2017 Interpretive Summary

Currently, there is a lack of research data linking agronomic and environmental performance across a wide variety of management conditions, leading to uncertainty regarding the full efficacy of 4R practices. Although there has been a concerted effort to promote 4R nutrient management strategies for using commercial fertilizer and organic materials, our ability to quantify and track the impacts of 4R management on crop yield, phosphorus (P) and nitrate loss to water, nitrogen (N) loss to the atmosphere, and changes in soil health under a range of practices needs further improvement.

The objective of this research is to quantify the impact of 4R Nutrient Stewardship practices on crop yield, soil health, nutrient use efficiency, nutrient loss via leaching, and gaseous N loss across eight coordinated field sites in Illinois, Indiana, Iowa, Minnesota, Missouri, and Ontario. Although sites will focus on N management, the consistent comparison across all sites will include partial nutrient balances for N, P, and K. All field sites are capable of capturing nutrient leaching losses in subsurface tile drains. Locally relevant and current nutrient management practices will be compared to the more advanced 4R management systems. In addition, several sites will investigate specific 4R variations including timing of N application and N placement by side-dress application.

The novelty of this network approach is that existing investment in agronomic/drainage research sites across the corn-belt can be leveraged to answer additional questions about the effectiveness of 4R practices. Data generated in this three-year project will be combined into a centralized database. Future studies on N management will allow for continued improvement of knowledge that supports management and policy recommendations. This effort will extend to help answer key questions about the impacts of nutrient management in corn-based cropping systems on water quality in the Mississippi River basin and eutrophication in the Gulf of Mexico.