Impacts of Cover Crops on Phosphorus and Nitrogen Loss with Surface Runoff

Issue: The Iowa Science Assessment of Nonpoint Source Practices included cover crops as a nutrient reduction strategy for producers to consider. This also was identified as an area where research is lacking, and where larger scale studies are needed to better assess water quality impacts.

Objective: Determine more predictably the impact of a rye annual cover crop on sediment, phosphorus and nitrogen loss with surface runoff for corn and soybean production systems managed with no-till or tillage. Although results will be obtained at one site, existing knowledge about Iowa soils, climate and processes involved will allow for acceptable extrapolations to other regions in Iowa.

Approach: A long-term experiment site will be established at an Iowa State University research farm. Cropping systems, tillage systems and runoff monitoring systems will be established during 2014, and the first water quality evaluations will be in 2015. The experiment will evaluate selected combinations of harvest management systems for corn and soybean with or without a rye cover crop and with or without tillage.

The P fertilizer will be broadcast uniformly across all plots to maintain an optimum soil-test P level. This placement method is used by most farmers in the state, and is the one for which cover crops would be the most beneficial. The N for corn will be injected into the soil at a uniform rate across the plots. Runoff will be analyzed for total solids, dissolved P, total P, dissolved ammonium-N, dissolved nitrate-N and total N. Soil of all plots will be sampled before applying all treatments. Total P and N will be measured in all plant parts harvested to estimate removal.

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