

Can we link nitrogen management to water quality?

The Iowa Soybean Association has been studying nitrogen (N) use in four watersheds: West Buttrick Creek (in the Raccoon River watershed), Pike Run Creek (in the lower Cedar River watershed), South Fork (in the upper Iowa River watershed), and the Boone River (in the Des Moines River watershed). Each study has seen its own unique findings.

West Buttrick Creek

Four years of N management evaluation have been completed on the majority of cornfields in the 27,000-acre West Buttrick Creek watershed in west central Iowa. It's an appropriate watershed for the evaluations because the extensive field tiling, high nitrate concentrations in the water, intensive row crop production, and some livestock in the area are largely representative of the larger North Raccoon River watershed, of which it is part.

Evaluation processes there so far include the intensive use of guided stalk sampling and replicated strip tests to evaluate corn responses to N management. Table 1 shows stalk sample results for 2005, showing similar results for fall anhydrous and spring applied N. These results are consistent with the yield results from the fall vs. spring strip tests.

Pike Run Creek

In both 2004 and 2005, a majority of cornfields in the 12,800-acre Pike Run watershed were evaluated in the Pike Run watershed — a sub-watershed of the Lower Cedar River. The watershed is hydrologically unique to Iowa, because it is slow moving stream. As opposed to a rolling and tumbling movement contained within a well-defined channel that is characteristic of many Iowa streams, Pike Run creeps through the watershed as if it were a series of connected sloughs more than a creek.

The Pike Run watershed lies in the heart of an ancient alluvial floodplain. The topsoil is fertile but shallow over a sandy subsoil. Its soils and topography are the result of being submerged under a large glacial lake from a long-ago era.

That means that when the rain falls here, it sinks in and disappears fast. The tile, terraces, and other drainage and conservation features that are common to much of Iowa's working land are conspicuously absent here. In its place is irrigation equipment.

While there is still considerable corn and soybean production, the area under evaluation has many light textured soils, little tiling and low nitrate concentrations in the surface wa-

ter and there are also many grass and wetland areas. However, findings in areas with these physical characteristics can be used in contrast with findings in other study areas to see if management response is universal across all soil types.

Table 2 shows results of stalk nitrate analysis in Pike Run Creek. Clearly, with considerably higher stalk nitrate concentrations with the side-dress treatments, more nutrients are reaching the plant through side-dress, likely because the light soils lose even spring-applied N. Most growers do not apply fall N on the sandy soils, because of the soils composition. Future testing on preventing loss through timing, form and placement on the sandy soils would be a reasonable focus.

South Fork

In 2005, South Fork watershed farmers enrolled more than 100 cornfields and collected over 400 guided stalk samples from selected areas of the 200,000-acre watershed. High rainfall and subsequently high N loss resulted in low stalk nitrate levels in tests in 2004, but in 2005, lower rainfall amounts made more management comparisons possible. Because of all the livestock in the area, manure N and availability of N from manure are spotlight issues in this watershed.

In addition to executing the broad scale stalk testing program, side-dressing of additional N on the manured soils was evaluated. Table 3 shows results of the stalk testing from fields where corn followed corn. What is interesting is that, of the three fertilizer sources used for comparison, all three had similar yields. This across-the-board response asks for further exploration.

Boone River

In 2005, a majority of the cornfields in two subwatersheds of the Boone River were enrolled in the program, with over 30 nitrogen trials taking place. The selected watershed area is representative of the much larger Boone River watershed, with intensive row crop and livestock (hog) production and high nitrate concentrations found in the water. Initial 2005 stalk test results indicate that more evaluations focused on timing of fertilizer application and differences in fertilizer sources may be beneficial to farmers

Building a relationship between agronomically-driven data and the environment

The Iowa Soybean Association has been collecting data about agronomic performance in several Iowa watersheds

