

Water Monitoring

Land use plays a significant role in water and nutrient movement through the soil, into tile drainage systems and waterbodies. The Iowa Soybean Association's (ISA) water monitoring program provides information to farmers about water quality on their farms. The Environmental Programs and Services (EPS) research team also looks at the results in aggregate to glean additional information from the data.

In 2018, the EPS team collected and analyzed nearly 4,000 water samples from 613 locations across Iowa. Of these monitoring locations, 334 were tile drainage outlets. The remaining sites are rivers and streams and structures including bioreactors, saturated buffers, ponds and wetlands.

Water samples were analyzed at ISA's accredited water laboratory in Ankeny and results were shared with the farmers. Aggregate summaries are provided so farmers can compare themselves with others. Farmers provide information on their fields that drain to the tile system including crop rotation, tillage or no-tillage, cover crops, nutrient management as well as the number of acres draining.

Using management data provided by participants and water quality results, EPS staff can provide an aggregated view of drainage water quality. The following findings examine the nitrate-nitrogen levels for differing aspects of crop production.

The crop planted on the drainage area plays a role in the nitrate-nitrogen loss, but it may not be as big of a difference as one might guess. Figure 1 shows the average nitrate concentration (thick black line in the middle of the box) for three common cropping systems.

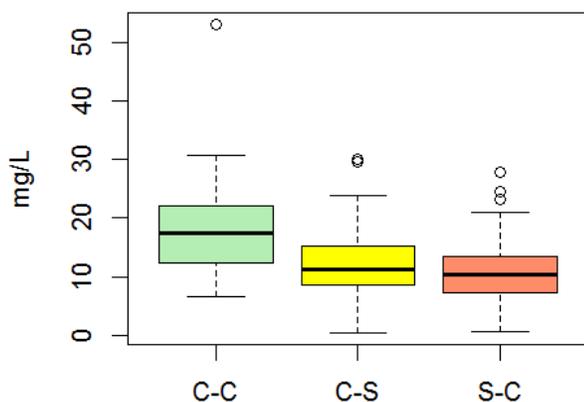


Figure 1. Average nitrate concentrations for cropping systems in Iowa. C-C is corn following corn; C-S is corn in 2018 and soybeans in 2017; S-C is soybeans in 2018 and corn in 2017.

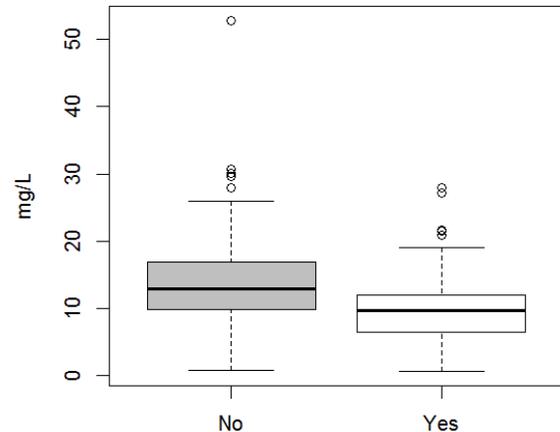


Figure 2. Average nitrate concentrations from fields with cover crops (Yes) and without cover crops (No) monitored for water quality in 2018.

Cover crops are a conservation practice widely promoted in Iowa. Statewide, fields with cover crops were shown to have lower drainage water nitrate-nitrogen concentrations than fields without cover crops (Figure 2). The average for sites with cover crops was 23 percent lower than for sites without.

Fertilizer applied to corn has a strong relationship to crop yield, however the relationship to tile water nitrate-nitrogen concentrations is typically weak. The exceptions are when there is significant over-application of fertilizer and when dry weather prevents the fertilizer from reaching the plant, leaving it vulnerable to loss after harvest. The implication is that, within the range of typical fertilizer rates, reducing fertilizer application rates alone is unlikely to reduce tile nitrate-nitrogen concentrations significantly. Thus, other practices should be considered to help meet the Iowa Nutrient Reduction Strategy's goals.

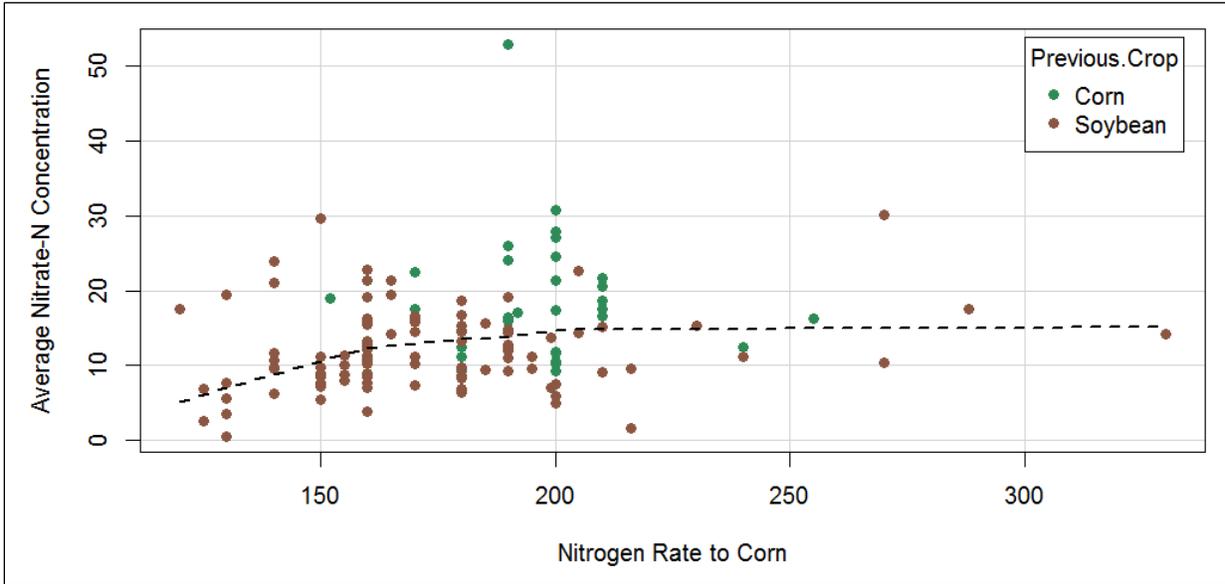


Figure 3. Range of total nitrogen applied and the relationship to tile nitrate-nitrogen concentrations. The dotted line is a smoothed trendline determined by the data, showing a weak and generally flat relationship.

Thank you to the farmers who participated in the 2018 monitoring program and to the partners who supported this work: Agriculture’s Clean Water Alliance, Practical Farmers of Iowa, Land O’Lakes SUSTAIN and Water Quality Initiative projects including the watersheds of Boone River, Miller Creek, Benton/Tama, West Fork of Crooked Creek, Lower Skunk River, Walnut Creek, Deep Creek, Taylor County, Cedar Creek and North Raccoon Farm to River Partnership.