



Drainage Water Management in Southeast Iowa

Intro

In the early days of conservation drainage, Iowa State University implemented side-by-side comparisons of multiple drainage practices to better understand their performance, benefits, and impacts. The first 4 years of data was published in 2012 with the remaining 5 published in 2017.

With year-to-year variabilities in weather (specifically rainfall amount and timing), it may be difficult to get an idea of long-term effects of drainage systems with only a handful of growing season data points. The additional 5 years of data at this site helps provide a more complete picture benefits and impacts of various drainage practices.

Site & Testing

Four drainage practices (undrained, conventional drainage, controlled drainage, and shallow drainage) were compared on side-by-side plots of 3- to 6-acres (8 total plots on 42-acres). These systems were installed in 2007 in silty clay loam soil and farmed in a corn-soybean rotation commonly found throughout Iowa and the Midwest. At this Southeast Iowa research farm, these plots monitored rainfall, drainage flow, water table depth, Nitrate-N concentration, and crop yield since 2007.

Each drainage system was designed with the same maximum drainage coefficient of $\frac{3}{4}$ " per day. Depth and spacing of the drainage systems are as follows:

- Conventional Drainage
 - 4' depth, 60' spacing
- Controlled Drainage
 - 4' depth, 60' spacing
 - Stoplogs placed during growing season; removed for fieldwork
- Shallow Drainage
 - 2.5' deep, 40' spacing
- Undrained (no subsurface drainage)

Results

Nitrate-Nitrogen concentrations in all of the drainage water was similar, so differences in total nitrate load leaving each plot corresponded to differences in the total amount of water drained from the plot. Shallow drainage and controlled drainage were both effective at reducing total amount of water drained, thus reducing total nitrate losses by about 30 to 60%.

Year over year rainfall amount and timing varied drastically, however, over the 9 years of these combined studies, the data began to average out the spikes of both wet and dry years. Undrained plots on average had 6% decrease in yield compared to the drained plots for both corn and soybeans. There was little yield difference between the different drainage practices.

Takeaway

When more water leaves a field, more nutrients tend to move with it. Practices like controlled drainage and shallow drainage keep more water on the landscape which keeps more nutrients in the soil. This can be beneficial in dry years and periods of drought, with low risk to yield differences in especially wet years.

Citation:

Schott, L., et al. "Drainage Water Management Effects over Five Years on Water Tables, Drainage, and Yields in Southeast Iowa." *Journal of Soil and Water Conservation*, vol. 72, no. 3, 2017, pp. 251–259., doi:10.2489/jswc.72.3.251. <https://www.jswconline.org/content/72/3/251>