

Installation and Cost of Uthe Bioreactor

RFR-A18125

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Introduction

Improving Iowa's water quality is a priority for agriculture. One edge-of-field technique to improve water quality is a bioreactor. Bioreactors intercept tile drainage water and remove nitrate.

Materials and Methods

During summer 2018, a bioreactor was installed on the Uthe Farm, a Committee for Agricultural Development (CAD) farm in Boone County. This bioreactor was placed on a 14-in. tile line that empties into Big Creek. A bioreactor uses a carbon source, in this case woodchips, to remove nitrates from tile water. Microorganisms in the woodchips convert nitrates in the water to nitrogen gas, reducing the amount of nitrates that flow into Big Creek.

Because of the size of the tile line and the amount of potential flow that could be entering the bioreactor during peak flow periods, the bioreactor was designed with two separate chambers. Each chamber is 120 ft long by 34 ft wide and filled with 3.5 ft of woodchips. The chambers are lined with a plastic liner and covered with fabric and soil.

The dual chamber design not only allows the treatment of such a large flow of water, it also creates a unique opportunity for research on

bioreactors. Because there are two identical chambers using the same tile water source, comparisons can be made between the two chambers. Sample ports have been installed in identical patterns in each chamber so these can be monitored.

Cost of Installation

Cost of the bioreactor totaled \$52,649. Of this, \$31,080 was for woodchips to fill the bioreactors. The rest of the costs included tile fittings, water control structures, and excavation of the site. Tile flow into the bioreactor is from approximately 100 acres of row crop, for a per acre cost of \$526.49. The expected life of the woodchips is 7 to 10 years, depending on the rate of decay.

Beginning spring 2019, monitoring of the flow entering and leaving the bioreactor, as well as samples taken from wells installed in each bioreactor chamber, will begin. The two identical chambers also will allow comparisons of treatments that could be added to the chambers. A native pollinator mix will be seeded on the surface of the bioreactor to provide an additional conservation benefit to the practice, as well as an aesthetic appeal.

Acknowledgements

Thanks to Big Creek Watershed Coordinator Sean McCoy, IDALS, NRCS, and the Iowa Soybean Association for design, implementation, and cost share of this practice.