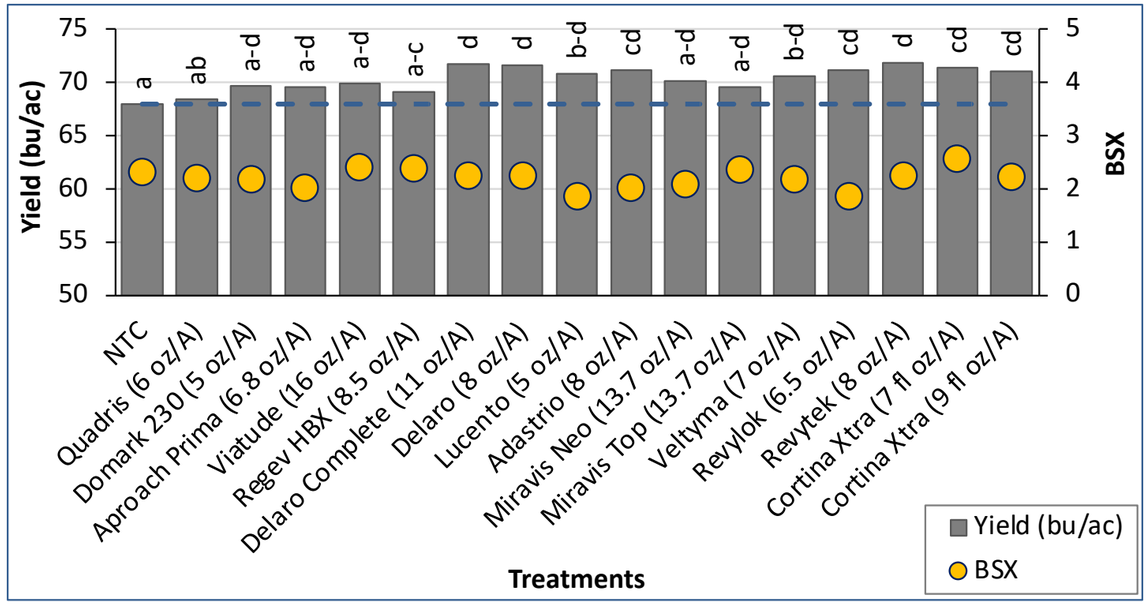

Figure 2. Average disease severity of Septoria brown spot index (BSX) (yellow dots) and average soybean yield in bushels per acre (gray bars) in plots applied with fungicide products and non-treated control (NTC) combined across all six experiment locations in 2025. All fungicide products were applied at their label recommended rate at the beginning of pod (R3) with a nonionic surfactant (Induce at 0.3% v/v). The treatments were not statistically different for both BSX (P = 0.051) and yield (P = 0.020). The blue horizontal dotted line represents the mean yield value of NTC. BSX (P = 0.051) and yield (P = 0.020). The blue horizontal dotted line represents the mean yield value of NTC.

Septoria brown spot was observed at all locations but at low levels. SDS was observed at Ames, Crawfordsville and Armstrong at low levels. Frogeye leaf spot (FLS) was not detected during the growing season. Fungicide applications had no statistically significant effect on BSX (P = 0.051); however, they significantly affected yield (P = 0.020) across six locations (Figure 2). Delaro Complete, Delaro, and Revytek produced significantly higher yields—averaging 3.7 bu/ac greater than the untreated control. Lucento, Adastrio, Veltyma, Revytek, and Cortina Xtra also yielded 2.6–3.3 bu/ac higher than the control. Overall soybean yield in 2025 exceeded that of the previous three years (Dangal et al. 2024; Mueller et al. 2025; Nieto et al. 2023).

Foliar fungicide applications can improve yield, especially under high foliar disease pressure. In this study, some fungicides increased yield even under low disease conditions; however, responses remain inconsistent when disease levels are minimal. Cercospora leaf blight was reported late in the season, suggesting that some infections may have developed after data collection. The detection of QoI-resistant Cercospora sojina and Septoria glycines further underscores the need for prudent fungicide use. Disease management should follow an integrated approach—combining crop rotation, resistant varieties, and fungicides with multiple modes of action—to reduce resistance risks and sustain yield potential.

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First year of nitrate removal at the recharged NERF denitrifying bioreactor

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Introduction

Denitrifying bioreactors, also known as woodchip bioreactors or just "bioreactors", clean nitrate from tile drainage water. There has been a bioreactor at the Northeast Research and Demonstration Farm (NERF) since 2009. In late summer 2024, this bioreactor was "recharged" meaning the woodchips were excavated and replaced. This report presents the first year of water monitoring results since the recharge.

Materials and Methods

The newly recharged bioreactor is 60 ft long with a 3 ft depth of woodchips. It has a unique trapezoidal cross-sectional shape (15 ft, top width; 8 ft, bottom width). Inflow and outflow water samples are collected from the bioreactor twice weekly. The amounts of tile drainage water that enter the bioreactor and that by-pass the bioreactor during times of high flow are logged.

Results and Discussion

Nitrate concentrations in the outflow samples were generally lower than concentrations in the corresponding inflow samples which meant the bioreactor was working (Figure 1). In the spring and early summer, the differences between the inflow and outflow samples were small because the bioreactor was treating a lot of water. Despite these small differences, the large amount of water being treated resulted in a large amount of nitrate being removed (that is, many pounds of nitrate were removed).

Overall, this bioreactor removed 160 lb of nitrate in 2025 by treating 7.09 million gallons of water (Table 1). This was most of the drainage water that came from the field in 2025 (76% was treated; Table 1). This equates to about 4 lbs of nitrate-N per acre removed, based on our best estimate of the drainage area that flows through the bioreactor. The NERF bioreactor removed more nitrate in this first year than other bioreactors on similarly-sized drainage areas which have removed an average of 130 lb per year.

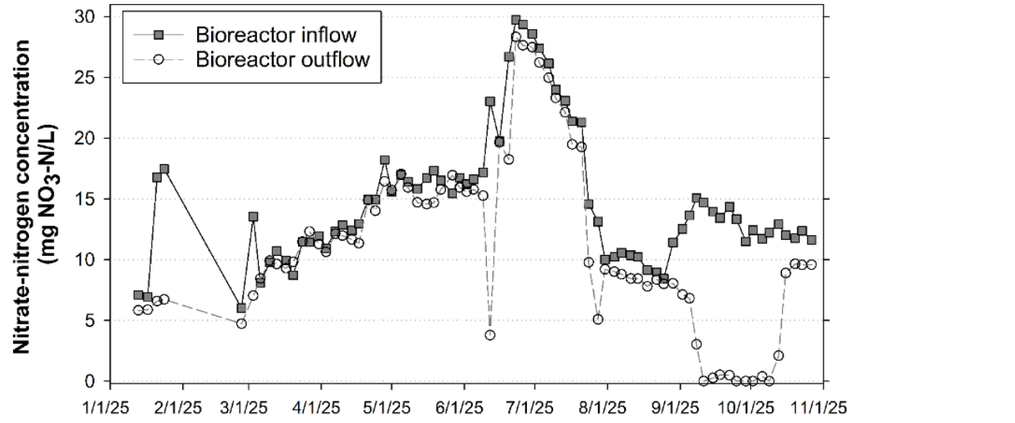

Figure 1: Inflow and outflow nitrate-nitrogen concentrations at the Iowa State University Northeast Research Farm (NERF) bioreactor in 2025.

Table 1: 2025 performance metrics for the Northeast Research Farm bioreactor compared to the performance of 12 site-years from bioreactors on similarly-sized drainage areas.

Year	2025 NERF bioreactor	Average of 12 site-years from other bioreactors with similar-sized drainage areas
Annual precipitation	39.6 inches	34.1 ± 12.1 inches
Flow treated	7.09 million gallons	5.27 ± 3.26 million gallons
% of annual drainage flow treated in the bioreactor	76%	50 ± 24%
Pounds of nitrate-N removed	160 lb	130 ± 80 lb
Nitrate removal efficiency for the treated water (%)	16%	60 ± 20%

Acknowledgements

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