Statewide evaluation of foliar fungicides on soybeans in 2025 in Iowa

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In 2025, commercial foliar fungicides were evaluated across six Iowa State University research and demonstration farms to determine their effect on disease control and yield response on soybeans. The locations included the Northwest Research and Demonstration Farm (Sutherland), Northern Research and Demonstration Farm (Kanawha), Northeast Research and Demonstration Farm (Nashua), Wyffles Farm (Central Iowa Research and Demonstration Farms, Ames), Armstrong Memorial Research and Demonstration Farm (Lewis), and Southeast Research and Demonstration Farm (Crawfordsville).

A total of 16 fungicides containing single or multiple active ingredients were evaluated at each location, along with a non-treated control (NTC). Fungicide treatments were laid out in a randomized complete block design with four replications. Plot size ranged from 24 to 35 feet long and 10 to 15 feet wide (4 or 6 rows at 30-inch inter-row spacing). At all locations, the cultivar was XO 2865E (Xitavo Soybean Seed), which was planted at 140,000 seeds/acre in a field that was corn the previous year. Planting dates across the locations and other field activity details are provided in Table 1.

All fungicides were applied using a self-propelled research sprayer at recommended rates at the beginning of pod (R3 growth stage) with nonionic surfactant (Induce at 0.3% v/v) and at a volume of 20 gallons per acre (Table 2). Foliar diseases were assessed between the R5 (beginning seed) and R6 growth stage (full seed). Septoria brown spot (caused by Septoria glycines) was assessed by measuring the height of the highest infected leaf in the canopy, and the disease severity was estimated as the percent of leaf area covered by the disease on the highest infected leaves which was converted to Septoria brown spot severity index (BSX). A total of two assessments, one in each center row, were collected and averaged per plot. Severity (%) of frogeye leaf spot (caused by Cercospora sojina) was assessed in ten randomly selected leaflets from the upper canopy of each plot. Sudden death syndrome (SDS) was observed at Ames, Crawfordsville, and Armstrong. SDS was assessed using the Southern Illinois University (SIU) rating system, where disease incidence (Di) represents the percentage of plants exhibiting SDS symptoms, and disease severity (Ds) is scored on a 1–9 scale. The foliar disease index (FDX) was calculated using the formula FDX = (Di × Ds) / 9. No other disease symptoms were observed. The two central rows of each plot were harvested at crop maturity with a 2009 Almaco SPC20 research plot combine and the total seed weight per plot and moisture content were measured. Seed weight was adjusted to 13 percent moisture, and yield was calculated in bushels per acre.

Table 1. Research farm location and planting, fungicide application, disease assessment, and harvest dates for six soybean fungicide trials throughout Iowa in 2025.

Farm	Ames	Sutherland	Kanawha	Nashua	Armstrong	Crawfordsville
Planting Date	May 8	May 3	May 12	May 13	April 23	April 28
Fungicide Application	July 22	July 21	July 23	July 21	July 28	August 7
Disease Assessment date	Sept 5	August 21	Sept 2	Sept 2	August 29	August 30
Harvest Date	Oct 4	Oct 18	Oct 9	Oct 20	Oct 3	Oct 3

Table 2. Fungicide products, FRAC group, manufacturer and their application rate for the 2025 soybean statewide foliar fungicide trials, conducted in six Iowa State research and demonstration farms throughout Iowa.

Product	FRAC group	Company	Rate (oz/A)
NTC	—	All	---
Quadris	11	Syngenta	6.0
Domark 230	3	Gowan	5.0
Aproach Prima	3,11	Corteva	6.8
Viatude	3, 11	Corteva	16.0
Regev HBX	3, BM 01	Summit Agro	8.5
Delaro Complete	3,7,11	Bayer	11.0
Delaro	3,11	Bayer	8.0
Lucento	3,7	FMC	5.0
Adastrio	3,11	FMC	8.0
Miravis Neo	3,7,11	Syngenta	13.7
Miravis Top	3,7	Syngenta	13.7
Veltyma	3,11	BASF	7.0
Revylok	3,7	BASF	6.5
Revytek	3,7,11	BASF	8.0
Cortina Xtra	3,11	Sipcam Agro	7.0
Cortina Xtra	3,11	Sipcam Agro	9.0

Results

In 2025, the precipitation pattern during the season was different across the locations. Nashua received the most cumulative precipitation from planting to harvesting (31.1 inches) among the six locations. Ames, Kanawha, Armstrong and Sutherland also received at least 20 inches of precipitation whereas Crawfordsville received the least amount of precipitation (17.48 inches) during the season (Figure 1). Precipitation was very low during August and September, which might have affected the development of diseases.

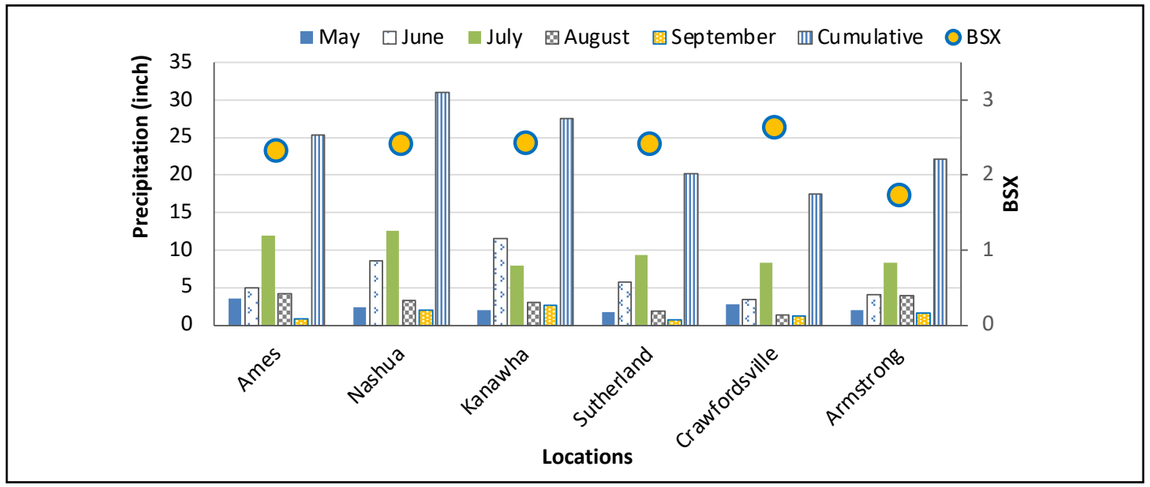

Figure 1. Monthly (May to September) and cumulative (planting to harvesting) precipitation and average Septoria brown spot severity index (BSX) at the nontreated control plots across the six research locations in Iowa during 2025.

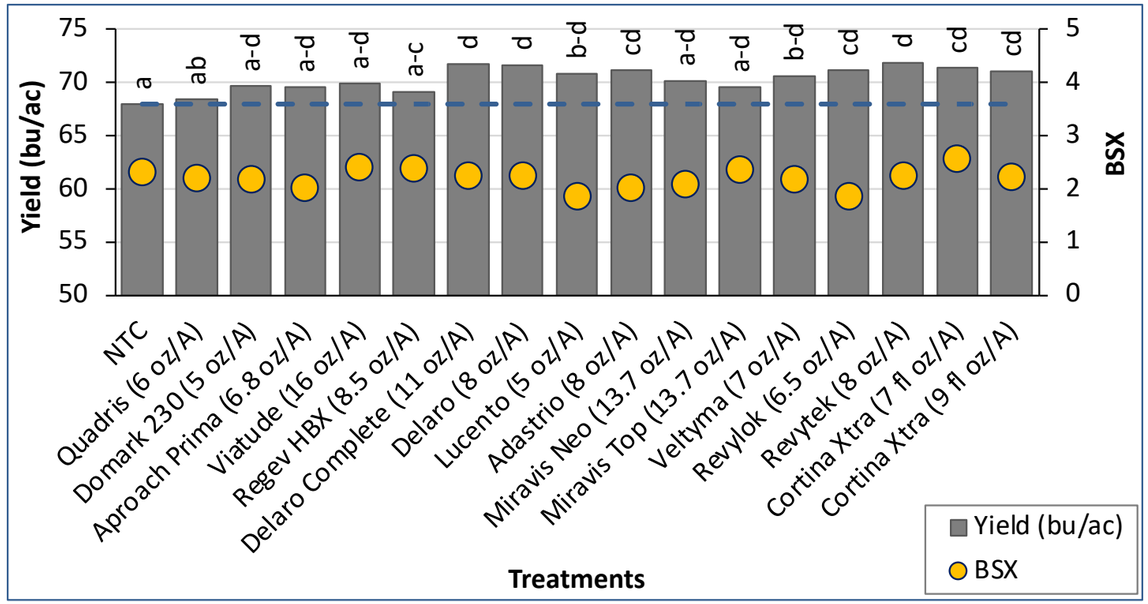

Figure 2. Average disease severity of Septoria brown spot index (BSX) (yellow dots) and average soybean yield in bushels per acre (gray bars) in plots applied with fungicide products and non-treated control (NTC) combined across all six experiment locations in 2025. All fungicide products were applied 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.

References

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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.

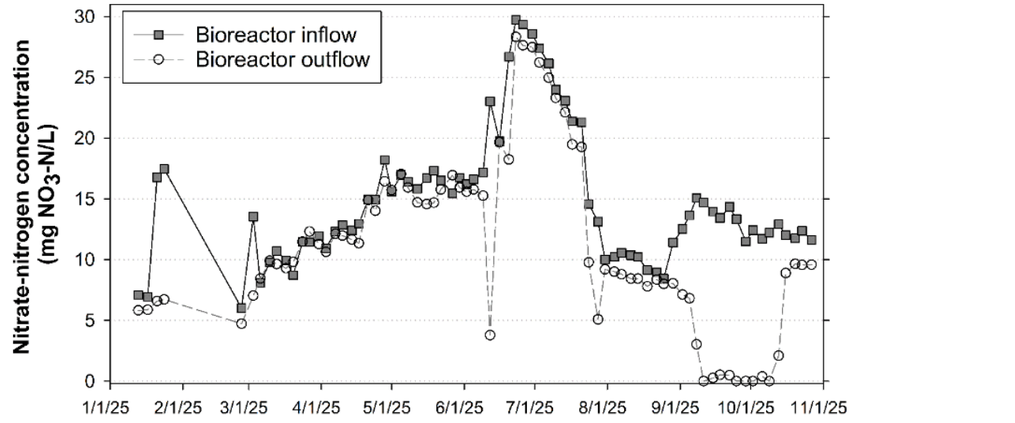

Figure 1: Inflow and outflow nitrate-nitrogen concentrations at the Iowa State University Northeast Research Farm (NERF) bioreactor in 2025.

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%

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