Trial Type: Fungicide
Growing Season: 2024

Project Objective: Quantify efficacy of fungicide products against economically significant soybean diseases as well as evaluate return on investment (ROI) for Iowa soybean farmers.

Project Insights:

1. In 2024, the use of fungicides resulted in a net loss of $23.32 per acre.
2. Fungicide use with little or no disease pressure was not profitable in 2023 or 2024.
3. Conditions were not favorable for disease development at most sites in the project.
4. Follow Integrated Pest Management (IPM) principles when making fungicide application decisions.

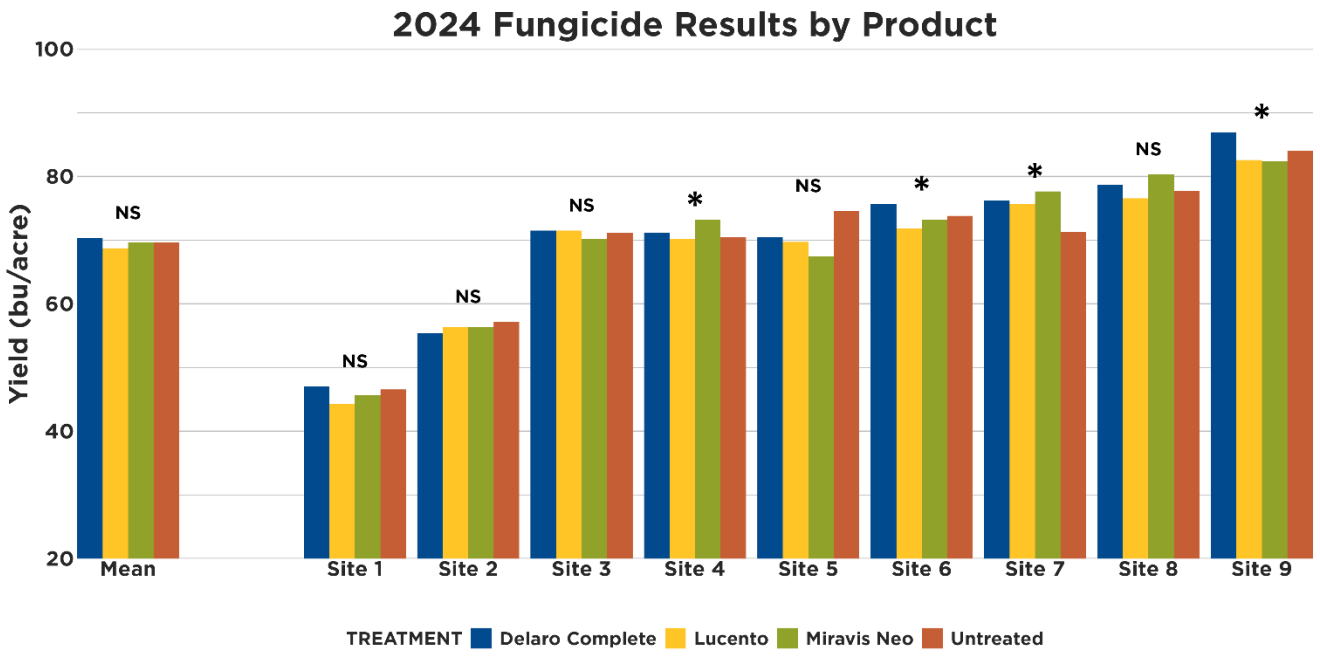


*Figure 1 Sites not statistically significant are indicated by "NS", sites marked with * represent a significant response between 2 or more of the treatments.*

2024 Project Discussion

Fungicide use continues to grow across the state as farmers' soybean management programs look to boost yield and ROI through combating disease and improving overall plant health. While popularity has grown, so have concerns over long-term effectiveness from products if not managed properly. Trials conducted by Iowa Soybean Association (ISA) in 2024 evaluated Delaro Complete (Bayer), Lucento (FMC), and Miravis Neo (Syngenta) products on overall yield and ROI, and response to economically significant soybean diseases. Across all sites, there was no significant difference between the fungicides and untreated, with only a few individual sites showing a positive significant response between at least one fungicide and the untreated (Figure 1). All sites were aerially applied using drones at beginning pod (R3 growth stage). Following application, scouting

of all sites occurred at full seed (R6 growth stage) to evaluate control of brown spot, frogeye leaf spot, rust, and white mold. Information on the fungicides, including Fungicide Resistance Action Committee (FRAC) groups and labeled soybean disease control based on our specific scouting protocol is shown in Table 1 with a map showing all locations around the state (Figure 2). Across all sites, the average return for a fungicide was a loss of $23.32 per acre.

Fungicide	Manufacturer	Labeled Control – Soybean Diseases	FRAC Groups
Delaro Complete	Bayer	Brown Spot, Frogeye leaf spot, Rust, White Mold (Suppression)	3 (Prothioconazole) 11 (Trifloxystrobin) 7 (Fluopyram)
Lucento	FMC	Brown Spot, Frogeye leaf spot, Rust, White Mold	7 (Bixafen) 3 (Flutriafol)
Miravis Neo	Syngenta	Brown Spot, Frogeye leaf spot, Rust, White Mold (Suppression)	7 (Pydiflumetofen) 3 (Propiconazole) 11 (Azoxystrobin)

Table 1 – Fungicides used in the 2024 project with respective parent company, labeled control, and FRAC group.

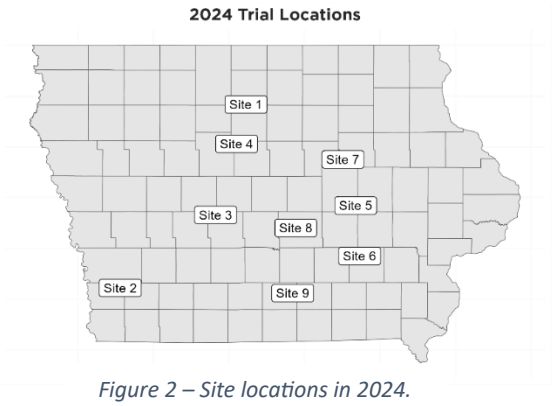


Figure 2 – Site locations in 2024.

At Site 5 (Figure 1), a large yield reduction was observed with the use of all fungicides but was not significant due to variability across the trial area. Historical changes to the field and management practices, specifically on the east side of the field, impacted the untreated checks and, ultimately, the overall trial results (Figure 3). While the attempt to reduce outside influences is targeted with replicated strips, this is an example of how field conditions can dramatically impact results and why multiple locations are needed in field studies. Due to these field changes, it is difficult to determine which effects were due to the fungicide and which were a response to changes in field conditions. Data from this site is not included in the following analysis.



Figure 3 – Site 5 yield map and average yield by strip from West to East.

Disease Pressure

In 2024, conditions were not favorable for disease development resulting in little disease pressure at most of the sites in the project. Field scouting during R6 growth stage, following fungicide application, showed the presence of Frog Eye Leaf Spot, White Mold, Septoria Brown Spot, and Bacterial Blight (which is not controlled with a fungicide) (Table 2). Disease ratings were scored on a 1-9 scale with 1 indicating no or very little disease present and 9 indicating greater than 85% leaf coverage. Frogeye leaf spot was the most common disease found (25.8% of total experimental blocks) with an average rating of 2.7. Even with low disease pressure across most sites, the untreated check resulted in higher disease ratings when frogeye, brown spot, or white mold were present.

Average Rating with Disease Present

	Frogeye	Bacterial Blight	White Mold	Brown Spot
Delaro Complete	2.7	3.0	4.0	2.5
Lucento	2.5	2.8	4.0	2.3
Miravis Neo	2.8	3.2	4.0	2.5
Untreated	2.8	3.0	n/a	2.6
Points Observed (out of 120)	31	22	3	27

Table 2 – Fungicides used in the project with average rating at locations where listed disease was observed. Bottom row indicates number of blocks disease was observed in from a total of 120 total blocks scouted.

At locations where disease was observed (disease rating of 2 or greater), each of the fungicides resulted in an average positive yield response (Figure 4). If no disease was observed, Delaro Complete and Miravis Neo showed a small positive yield response while Lucento had a negative yield response. Overall, a disease was identified in 25% of the total fungicide treatment blocks in the project, with the majority having a positive yield response when compared to the untreated check in the same location (Table 3).

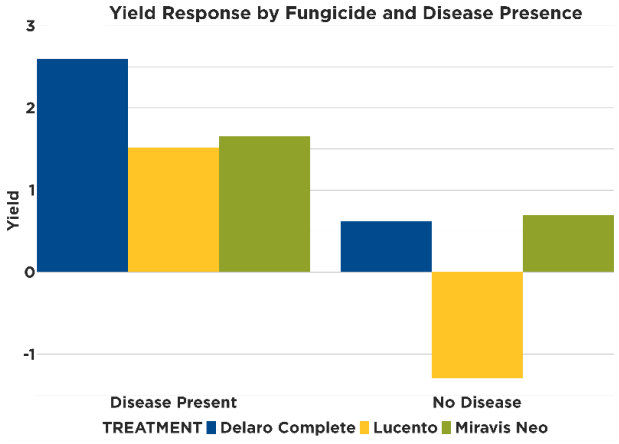


Figure 4 – Average yield response of each fungicide (Y-axis) based on whether a disease was observed (X-axis). A negative value indicates a yield loss.

Fungicide Overview with Disease Present

Fungicide	Total Points with Disease	Positive Yield Response (%)
Delaro Complete	11	81.8%
Lucento	10	60%
Miravis Neo	9	66.7%

Table 3 – Number of points observed with disease in each fungicide treatment and percent positive yield response.

Return On Investment - 2024

Pricing on products can be difficult to source and depends on local availability, quantity ordered, and additional discounts that may be available to the farmer. Average prices were based on information provided by farmers and retailers. Table 4 shows the average cost per acre for each product and the required breakeven yield response based on 2024 average soybean prices of $11.11 per bushel and application cost of $10 per acre.

OVERALL SITE AVERAGES

Fungicide	Product Cost $/ac	Application cost $/ac	Avg Yield bu/ac	Avg Response bu/ac	Net Result $/ac
Delaro Complete	$23.93	$10.00	70.56	1.6	-$16.15
Miravis Neo	$19.32	$10.00	69.70	1.02	-$17.99
Lucento	$21.93	$10.00	68.75	-0.35	-$35.82

Table 4 – Overall ROI for each of the fungicides based on product costs obtained from farmers and retailers, application cost of $10 from ISU Cost of Production survey, and average soybean price of $11.11.

Regardless of the presence of disease, overall ROI was negative for all fungicides used (Table 5). Where disease was noted in field scouting, net return losses were lower than those locations where disease was not observed.

OVERALL SITE AVERAGES WITH SCOUTING

		DISEASE PRESENT		NO DISEASE	
Fungicide	Product Cost $/ac	Avg Response bu/ac	Net Result $/ac	Avg Response bu/ac	Net Result $/ac
Delaro Complete	$23.93	2.59	-$5.15	0.62	-$27.04
Miravis Neo	$19.32	1.66	-$10.88	0.7	-$21.54
Lucento	$21.93	1.52	-$15.05	-1.29	-$46.26

Table 5 – Overall ROI for each of the fungicides based on presence of disease from field scouting.

Site 7 showed the highest disease severity of all sites (average 3.1) and was the only location with a positive ROI. Yield response was positive for each fungicide compared to the untreated check (Figure 5, Table 6).

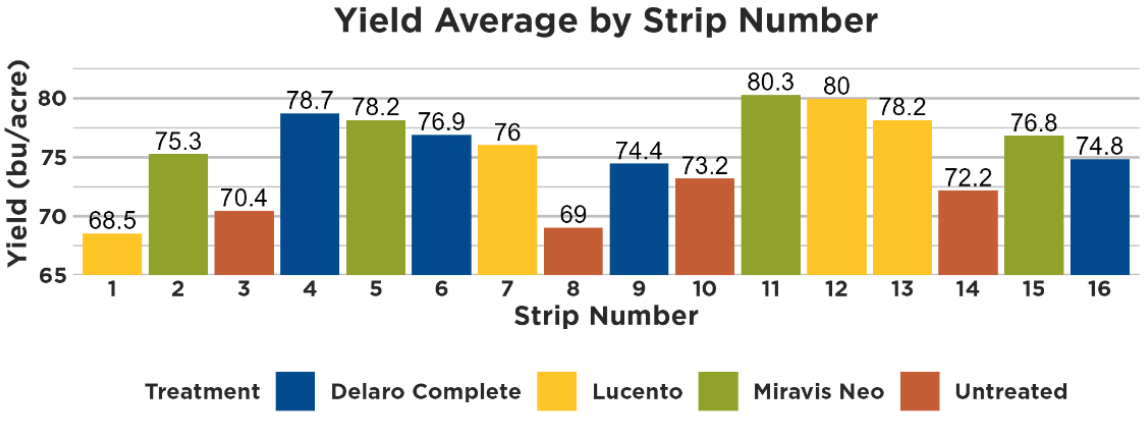


Figure 5 – Average yield by strip for each treatment at Site 7.

Fungicide	Product Cost $/ac	Application cost $/ac	Avg Yield bu/ac	Avg Response bu/ac	Net Result $/ac
Delaro Complete	$23.93	$10.00	76.24	5.01	$21.73
Miravis Neo	$19.32	$10.00	77.64	6.41	$41.90
Lucento	$21.93	$10.00	75.67	4.44	$17.40

Table 7 – ROI for each of the fungicides at Site 7.

Return On Investment – 2023 and 2024

This project was also completed in 2023 with Lucento (FMC, FRAC 7/3), Miravis Neo (Bayer, FRAC 7/3/11), and Veltyma (BASF, FRAC 3/11) fungicide products (Figure 6). Like 2024, most locations in 2023 did not see conditions favorable for disease development resulting in very low pressure with an average disease rating of 2.2. Ultimately, given the low disease pressure, no site showed a positive ROI from the use of fungicide. A breakdown of the ROI for 2024 and 2023 is shown in Table 8 below.

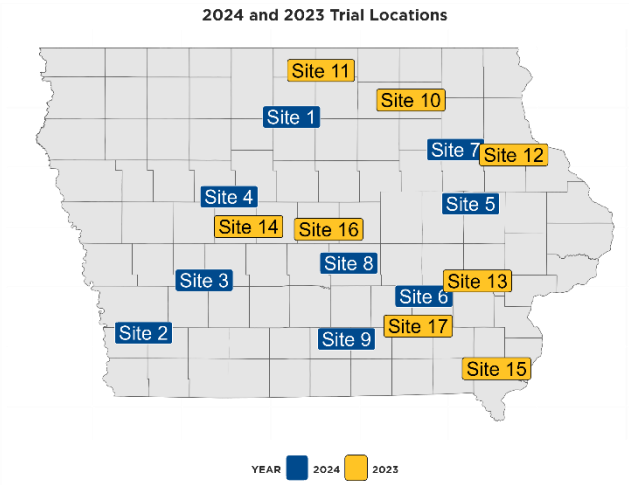


Figure 6 – Site locations in 2023 and 2024.

		2024		2023	
Fungicide	Product Cost $/ac	Avg Response bu/ac	Net Result $/ac	Avg Response bu/ac	Net Result $/ac
Delaro Complete	$23.93	1.6	-$16.15		
Lucento	$21.93	-0.35	-$35.82	-0.74	-$40.15
Miravis Neo	$19.32	1.02	-$17.99	-0.85	-$38.76
Veltyma	$18.27			-0.83	-$37.49

Table 8 – ROI for each of the fungicides used in 2023 and 2024 based on product costs obtained from farmers and retailers, application cost of $10 from ISU Cost of Production survey, and average soybean price of $11.11.

Comparing both years, the overall findings suggest that fungicide use in the absence of, or with very little, disease does not generate a positive ROI or guarantee a positive yield response. Continued use year over year, especially without rotating formulas, can also lead to additional issues from disease resistance to fungicides. Farmers are encouraged to follow IPM practices when making fungicide input decisions.