Applied Research in Field Crop Pathology for Indiana - 2024

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SUMMARY OF 2024 FIELD CROP DISEASE SEASON

CORN

In 2024, there was moderate disease on corn in Indiana across the state, details of major issues listed below. Gray leaf spot, northern corn leaf blight, northern corn leaf spot and southern rust were found in pockets. Tar spot and southern rust were two diseases that were closely monitored this season.

Tar spot:

Tar spot of corn was a concern due to previous epidemics. In 2024, high levels of tar spot occurred in pockets across the state. The environmental conditions are key in determining field risk year to year as temperature and leaf wetness plays an important role in tar spot disease development. The sixth year of tar spot-directed research has been completed in Indiana.

We continue to scout for tar spot across the state. Five new counties were confirmed with tar spot in 2024. This is the **first time all 92 counties were confirmed with active tar spot during a single season** (Figure 1). It is important to document tar spot movement in the state, so that when favorable conditions arise, tar spot disease risk can be more accurately assessed across the remainder of the state.

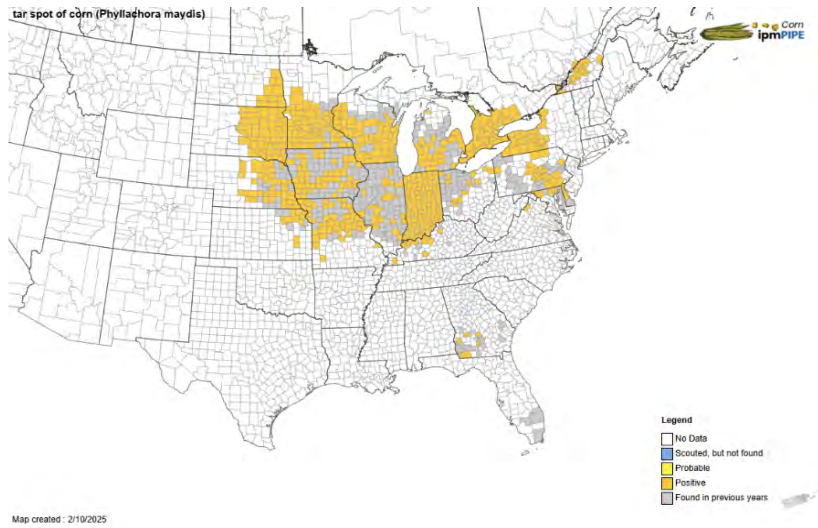

Figure 1. 2024 tar spot tracking across the U.S. and Canada. Yellow indicates a positive sample was collected from that county during the 2024 season, gray indicates that tar spot has been found previously. Image source: IPM Pipe https://corn.ipmpipe.org/tarspot/ on 02/10/2025.

Southern corn rust: Southern corn rust was first found in Indiana on July 25 2024. A total of 14 counties were confirmed to have the disease present by the end of the season (Figure 2). Southern rust pustules generally tend to occur on the upper surface of the leaf and produce chlorotic symptoms on the underside of the leaf (Figure 2). These pustules rupture the leaf surface and are orange to tan in color. They are circular to oval in shape. Common rust was also widespread and both diseases could be present on a leaf and easily mistaken for each other. It is important to send a sample to the Purdue Plant Pest Diagnostic Lab (PPDL) for confirmation if southern rust is suspected. There is an increased risk for yield impact if southern rust is identified early in the season.

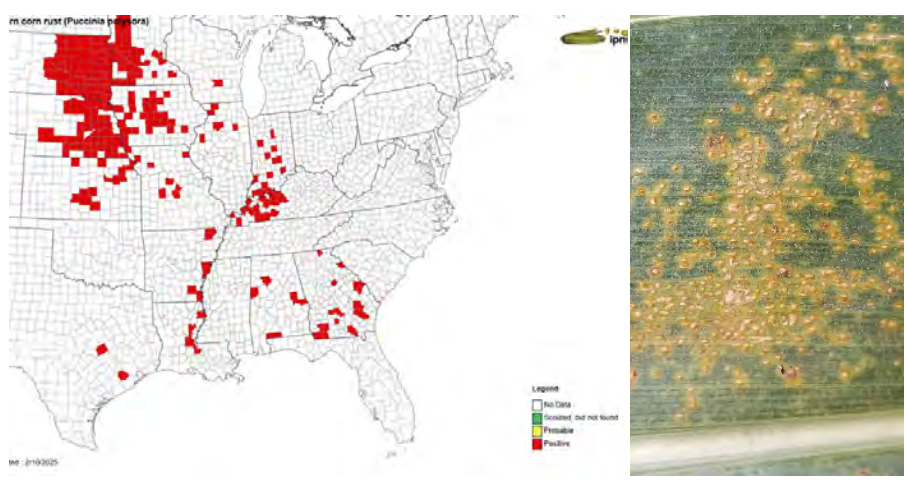

Figure 2. Southern corn rust map of confirmed (red) counties that had southern corn rust in 2024 and a corn leaf with southern rust infection. Photo credit: D. Telenko, Map source: https://corn.ipmpipe.org/southerncornrust/

SOYBEAN

Diseases in soybeans remained relatively low throughout the season for much of the state. Our research sites and sentinel plots across the state saw low levels of frogeye leaf spot, Cercospora leaf blight, Septoria brown spot, downy milde, and white mold. There were also pockets where sudden death syndrome caused issues in fields. We had new reports of red crown rot which has now been confirmed in eight Indiana counties (Figure 3).

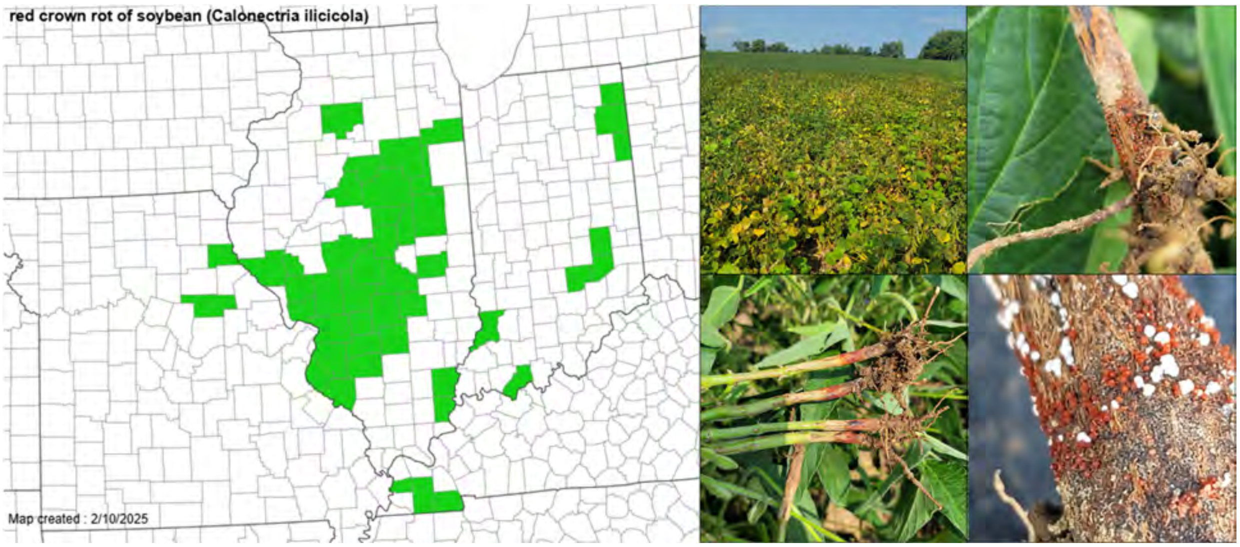

Figure 3. Red crown rot of soybean map and symptoms of red crown rot in the field, which typical red crown discoloration and orange-reddish spore bearing structures that can form on the soybean crown/stem. Photo credit: D. Telenko, map source https://cropprotectionnetwork.org/maps/red-crown-rot-map

WHEAT

Fusarium head blight (FHB) or scab is one of the most impactful diseases of wheat and among most challenging to prevent. In addition, FHB infection can cause the production of a mycotoxin called deoxynivalenol (DON or vomitoxin). The conditions in 2024 were moderately conducive to FHB development. Our research sites in both West Lafayette and Vincennes had moderate levels of FHB develop in our nontreated susceptible cultivar checks and DON detection ranged anywhere from 4.0 to 9.4 ppm in the grain (Figure 4). Fusarium head blight management requires an integrated approach, including selection of cultivars with moderate resistance and timely fungicide application at flowering. Very few other diseases observed in our wheat trials.

Figure 4. Wheat head exhibiting Fusarium head blight symptoms in a field. An example of the bleached spikelets on an infected head with pink/salmon fugal sporulation. Photo credit: D. Telenko.

CORN (*Zea mays* 'P0574AM')
Tar spot; *Phyllachora maydis*
Gray leaf spot; *Cercospora zeae-maydis*
Northern corn leaf blight; *Exserohilum turcicum*

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Fungicide evaluation for foliar diseases in corn in central Indiana, 2024 (COR24-01.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for non-irrigated grain corn production in Indiana were followed. Corn hybrid 'P0574AM' was planted in 30-inch row spacing at a rate of 34,000 seed/A on 13 May. Foliar applications were made at tassel/silk (VT/R1) growth stage on 20 Jul. All foliar fungicide applications were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Disease ratings were assessed on 3 Sep at dent (R5) growth stage. Tar spot, gray leaf spot (GLS), and northern corn leaf blight (NCLB) severity visually assessed as a percentage (0-100%) of affected leaf area at ear leaf on five plants in each plot and values were averaged before analysis. Lodging was evaluated on 16 Sep by determining the percentage of lodged stalks when pushed from shoulder height to the 45° from vertical. The two center rows of each plot were harvested on 8 Oct and yields were adjusted to 15.5% moisture. All disease and yield data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for disease development. Tar spot, gray leaf spot (GLS), and northern corn leaf blight (NCLB) and southern rust were present in the trial. There was not significant effect of fungicide treatments on reducing foliar disease severity over nontreated control (Table 1). No significant differences were observed for canopy greenness, lodging, harvest moisture, test wight, and yield of corn.

Table 1. Effect of treatments foliar disease severity, canopy greenness, lodging, and yield of corn.

Treatment and rate/A[z]	Total leaf disease[y] %	Canopy green[x] %	Lodging[w] %	Harvest moisture %	Test weight lb/bu	Yield[v] Bu/A
Nontreated control	4.8	25.0	7.8	17.1	57.5	208.8
Veltyma 3.34 SC 7.0 fl oz	2.7	31.3	0.0	17.5	59.2	217.0
Delaro Complete 3.82 SC 8.0 fl oz	1.1	30.8	5.0	17.3	55.1	214.5
Aproach Prima 2.34 SC 6.8 fl oz	1.7	27.5	2.5	17.7	55.7	210.7
Adastrio 4.0 SC 8.0 fl oz	1.6	27.5	7.5	17.6	55.3	204.2
Miravis Neo 2.5 SE 13.7 fl oz	1.1	30.0	2.5	17.7	55.4	201.0
Trivapro 2.21 SE 13.7 fl oz	1.0	31.3	2.5	17.6	55.4	211.8
Headline AMP 1.68 SC 10.0 fl oz	1.9	28.3	2.5	17.5	55.6	212.7
Proline 4.0 SC 5.7 fl oz	4.0	27.5	5.0	17.6	55.3	208.6
Quadris 2.08 SC 6.0 fl oz	1.9	28.3	5.0	17.4	56.7	208.5
Tilt 3.6 ES 4.0 fl oz	3.0	28.8	5.0	17.4	55.3	210.8
P-value[u]	*0.0682*	*0.4710*	*0.8799*	*0.9313*	*0.5933*	*0.5839*

[z] Foliar applications were made at tassel/silk (VT/R1) growth stage on 20 Jul. All foliar fungicide applications were applied at 15 gal/A.

[y] Foliar disease severity (tar spot, gray leaf spot, northern corn leaf blight and southern rust) visually assessed as percentage (0-100%) of symptomatic leaf area on ear leaf on 3 Sep. Five plants were assessed per plot and averaged before analysis.

[x] Canopy greenness as %, visually rated per plot was assessed on 16 Sep at R5.

[w] Lodging was evaluated on 25 Sep by determining the percentage of lodged stalks when pushed from shoulder height to the 45° from vertical.

[v] Yields were adjusted to 15.5% moisture and harvested on 8 Oct.

[u] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α =0.05).

CORN (*Zea mays* 'W2585VT2PRIB' and 'P0589AMXT ')
Tar spot; *Phyllachora maydis*
Gray leaf spot; *Cercospora zeae-maydis*
Northern corn leaf blight; *Exserohilum turcicum*

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Evaluation of tillage, hybrid, and fungicide for foliar diseases in corn in central Indiana, 2024 (COR24-04.ACRE)

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a split-plot with six replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was in the no-till treatments was corn and full-till soybean. Standard practices for non-irrigated grain corn production in Indiana were followed. The tillage blocks (no-till and full-tillage) was main effect. Two corn hybrids and fungicide application (yes/no) were factorial arrangement in the subplots. Corn hybrids 'W2585VT2PRIB' and 'P0589AMXT' were planted in 30-inch row spacing at a rate of 2 seeds/ft on 14 May. Veltyma fungicide at 7.0 fl oz/A was applied at tasseling/silking (VT/R1) growth stage. All foliar fungicide applications were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Disease ratings were assessed on 17 Sep at dent/maturity (R5/R6) growth stage and were rated by visually assessing the percentage (0-100%) of symptomatic leaf area at ear leaf on ten plants in each plot. Values for each plot were averaged before analysis. The two center rows of each plot were harvested on 8 Oct and yields were adjusted to 15.5% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were favorable for disease. Tar spot, gray leaf spot (GLS), and northern corn leaf blight (NCLB) were present in the trial. There was a significant interaction found tillage, hybrid, and fungicide treatments for disease severity therefore simple effects were analyzed. Tar spot severity was more severe in the plots with full-tillage planted to W2585VT2RIB and not treated with a fungicide, followed by no-till planted to W2585VT2RIB and not treated by a fungicide (Table 2). The P0589AMXT hybrid had significantly less tar spot than W2585VT2RIB when nontreated with a fungicide. A fungicide application at VT/R1 significantly reduced disease in the susceptible hybrid under both tillage treatments. A fungicide application also significantly reduced disease in the moderately resistant hybrid when planted in full-tillage. Gray leaf spot (GLS) had higher severity in the no-till planted to W2585VT2RIB and not treated by a fungicide. The addition of a fungicide at VT/R1 significantly reduced GLS in the no-till plots in both hybrids. There were no significant differences between treatments under full-tillage, as all had the low level of GLS. Northern corn leaf blight had the highest severity in no-till plots with both hybrids not treated with a fungicide. A fungicide application significantly reduced NCLB in the no-till plots, there were no significant differences between hybrids and treatment in the full-tillage plots. There was no significant difference in treatments for lodging. Harvest moisture was highest in W2585VT2RIB plus fungicide in both tillage treatments. Test weight was highest under full-tillage, with P0589AMXT and not treated with a fungicide. Corn yield was highest in the full-tillage with hybrid W2585VT2PRIB with a fungicide application, but this was not significantly different from W2585VT2PRIB nontreated or P0589AMXT treated with a fungicide.

Table 2. Effect of tillage, hybrid and fungicide for foliar disease risk in corn and yield of corn.

Tillage, hybrid, treatment, and rate/A[z]	Tar spot %[y]	GLS %[y]	NCLB %[y]	Lodging %	Harvest moisture %	Test weight lb/bu	Yield[x] bu/A
No-Till, W2585VT2PRIB, Nontreated control	17.6 b	7.2 a	19.5 a	3.3	17.7 b	55.0 c	208.0 d
No-Till, W2585VT2PRIB, Veltyma 7.0 fl oz	0.4 d	1.1 cd	5.9 bc	3.3	18.7 a	54.9 c	219.9 c
No-Till, P0589AMXT, Nontreated control	1.0 d	5.1 b	13.9 a	10.0	16.8 d	56.2 ab	199.3 d
No-Till, P0589AMXT, Veltyma 7.0 fl oz	0.3 d	2.3 c	6.2 bc	5.0	17.6 b	56.3 ab	205.0 d
Full Till, W2585VT2PRIB, Nontreated control	22.5 a	0.9 d	4.7 bc	6.7	17.5 bc	56.0 ab	254.4 ab
Full Till, W2585VT2PRIB, Veltyma 7.0 fl oz	7.1 c	0.1 d	0.3 c	1.7	18.5 a	55.6 bc	263.6 a
Full Till, P0589AMXT, Nontreated control	5.6 c	0.9 d	7.3 b	1.7	16.3 c	57.0 a	251.1 b
Full Till, P0589AMXT, Veltyma 7.0 fl oz	2.3 d	0.1 d	0.5 c	0.0	16.8 cd	55.7 bc	257.1 ab
P-value[w]	*0.0001*	*0.0001*	*0.0001*	*0.0982*	*0.0001*	*0.0044*	*0.0001*

[z] The fungicide (Veltyma 7.0 fl oz/A) was applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart and applied on 2 Aug at tasseling/silking (VT/R1) growth stage.
[y] Foliar disease severity visually assessed as percentage (0-100%) of symptomatic leaf area on ear leaf, with ten plants were assessed per plot and averaged before analysis on 17 Sep at dent/maturity (R5/R6) for tar spot stromata and on 10 Sep at dent/maturity (R5/R6) for GLS and NCLB. GLS = gray leaf spot; NCLB = northern corn leaf blight. [x] Yields were adjusted to 15.5% moisture and harvested on 8 Oct. [w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (*Zea maydis*)
Seeding disease; *Pythium sylvaticum*

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Evaluation of seed treatments for Pythium in corn in central Indiana, 2024 (COR24-32.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for non-irrigated grain corn production in Indiana were followed. Corn was planted in 30-inch row spacing at a rate of 2 seeds/ft on 13 May. Treated seeds were provided by cooperator. Inoculum of *Pythium sylvaticum* was applied within the seedbed at 1.24 g/ft at planting. Stand counts were assessed on 17 Jun at V4 growth stage. The two central rows of each plot were harvested on 9 Oct. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for disease development. The seed treatment of Thiamethoxam 2.5 fl oz + M-5P23 1.0 fl oz had significantly less stand than control of Thiamethoxam 2.5 fl oz and Thiamethoxam 1.28 fl oz + M-123 EP 0.8 fl oz + M-5P23 0.5 fl oz on 17 Jun. All seed treatments increase canopy greenness at R5 over the control of Thiamethoxam 2.5 fl oz (Table 3). There was no significant effect of seed treatment on harvest moisture, test weight, and yield of corn.

Table 3. Effect of seed treatment on stand count, canopy greenness, and yield of corn.

Seed treatment and rate/cwt[z]	Stand count[y] #/A	Canopy green[x] %	Harvest moisture %	Test weight lb/bu	Yield[w] bu/A
Control - Thiamethoxam 2.5 fl oz	36,881 a	76.3 c	15.6	62.0	211.4
Thiamethoxam 2.5 fl oz + mefenoxam 0.08 fl oz	35,647 ab	81.3 b	15.4	61.4	202.9
Thiamethoxam 2.5 fl oz + M-123 EP 0.8 fl oz	35,864 ab	82.5 ab	15.4	61.3	200.6
Thiamethoxam 2.5 fl oz + M-5P23 0.5 fl oz	35,574 ab	81.3 b	15.5	61.3	194.9
Thiamethoxam 2.5 fl oz + M-5P23 1.0 fl oz	34,267 b	85.0 a	15.8	60.4	200.5
Thiamethoxam 1.28 fl oz + M-123 EP 0.8 fl oz + M-5P23 0.5 fl oz	37,462 a	83.8 ab	13.1	56.0	199.6
P-value[v]	*0.0472*	*0.0012*	*0.1343*	*0.4213*	*0.6114*

[z] All plots were inoculated with *Pythium sylvaticum* at 2.0 g/ft within the seedbed at planting on 13 May.
[y] Stand count was assessed on 17 Jun at V4 growth stage.
[x] Canopy greenness as % (0-100), visually rated per plot and was assessed on 5 Sep at R5.
[w] Yields were adjusted to 15.5% moisture and harvest on 9 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (*Zea mays* 'PR111-20SSC' and 'PR108-20SSC')
Tar spot; *Phyllachora maydis*
Gray leaf spot; *Cercospora zeae-maydis*
Northern corn leaf blight; *Setosphaeria turcica*

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Fungicide comparison for foliar diseases on short corn in central Indiana, 2024 (COR24-38.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for grain corn production in Indiana were followed. Corn hybrid 'PR111-20SSC' and 'PR108-20SSC' was planted in 30-inch row spacing at a rate of 2 seeds/ft on 14 May. All fungicide were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicides were applied on 20 Jul at tassel/silk (VT/R1) growth stage. Disease ratings were assessed on 3 Sep at dent (R5) growth stage. Tar spot, gray leaf spot (GLS), and northern corn leaf blight (NCLB) severity was visually assessed as a percentage (0-100%) of symptomatic leaf area at ear leaf on five plants per plot and averaged before analysis. The two center rows of each plot were harvested on 8 Oct and yields were adjusted to 15.5% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for foliar diseases. Tar spot, gray leaf spot (GLS), and northern corn leaf blight (NCLB) were the most prominent diseases in the trial. There was no significant interaction between hybrid and fungicide application, therefore main effects are shown (Table 4). There was no significant difference between hybrids for foliar disease severity, except for PR111-20SSC had significantly less NCLB compared to PR108-20SSC. PR111-20SSC significantly increased grain moisture and yield over PR108-20SSC, but there were no significant differences in test weight between hybrids. Delaro Complete significantly reduced tar spot, GLS, and NCLB severity over the nontreated control. There were no significant differences between treatments for harvest moisture, test weight and yield of corn.

Table 4. Effect of treatment on foliar diseases and yield of corn.

Treatment[z]	Tar spot[y] % stromata[y]	GLS[y] % severity[y]	NCLB[y] % severity[y]	Harvest moisture %	Test weight lb/bu	Yield[x] Bu/A
Hybrid						
PR111-20SSC	1.1	1.0	0.6 b	21.9 a	53.3	207.2 a
PR108-20SSC	0.9	0.8	1.7 a	19.7 b	54.9	191.8 b
Fungicide						
Nontreated control	1.7 a	1.2 a	1.7 a	21.1	54.8	201.6
Delaro Complete 3.82 SC 8.0 fl oz/A	0.4 b	0.5 b	0.7 b	20.4	53.5	197.3
P-value *hybrid*[w]	*0.5077*	*0.2793*	*0.0106*	*0.0009*	*0.4611*	*0.0040*
P-value *fungicide*	*0.0005*	*0.0032*	*0.0301*	*0.2125*	*0.5890*	*0.2405*
P-value *hybrid*fungicide*	*0.8459*	*0.7464*	*0.3046*	*0.6046*	*0.6867*	*0.1026*

[z] Fungicides were applied on 20 Jul at tassel/silk (VT/R1) growth stage.
[y] Foliar disease was visually assessed as the percentage (0-100%) of affected leaf area on five plants in each plot at the ear leaf on at dent (R5) growth stage on 3 Sep. GLS = gray leaf spot; NCLB = northern corn leaf blight.
[x] Yields were adjusted to 15.5% moisture and harvest on 8 Oct.
[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

SOYBEAN (*Glycine max* 'P29A19E')
Frogeye leaf spot; *Cercospora sojina*
Septoria brown spot; *Septoria glycines*
Cercospora leaf blight; *Cercospora* spp.

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Comparison of fungicide efficacy for foliar diseases of soybean in central Indiana, 2024 (SOY24-01.ACRE).

A trial was conducted at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows were utilized for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'P29A19E' was planted in 30-in. row spacing at a rate of 140,000 seeds/A on 8 May. Fungicide applications were applied on 18 Jul at beginning pod (R3) and were applied at 15 gal/A at 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart at 3.6 mph. Disease ratings were assessed on 31 Aug at full seed growth stage (R6). Frogeye leaf spot was rated for disease severity by visually assessing the symptomatic leaf area in the canopy. Canopy defoliation was visually rated on a scale of 0-100% on 31 Aug. Percent green stem was visually assessed percentage (0-100%) of plans in plot on 26 Sep. The two center rows of each plot were harvested on 26 Sep, and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for disease development. Frogeye leaf spot, Septoria brown spot, and Cercospora leaf blight were the most prominent diseases in the trial and reached low severity. All fungicide treatments significantly reduced frogeye leaf spot severity compared to the nontreated control (Table 5). Veltyma, Echo + Folicur + Topsin, Delaro Complete, Topguard, and Revyteck significantly reduced canopy defoliation as compared to the nontreated control on 31 Aug. There was significantly more green stem with a treatment of Trivapro and Veltyma over nontreated control at harvest. There were no differences between fungicides and the nontreated control for yield of soybean.

Table 5. Effect of treatments on foliar diseases and yield of soybean.

Treatment and rate/A[z]	FLS % severity[y]	Defoliation %[x]	Green stem %[w]	Yield[v] bu/A
Nontreated control	0.7 a	5.0 a	2.5 cd	78.6
Topguard EQ 4.29 SC 5.0 fl oz	0.1 b	3.0 bc	3.5 bcd	80.1
Lucento 4.17 SC 5.0 fl oz	0.2 b	3.8 ab	3.5 bcd	78.9
Trivapro 13.7 fl oz	0.1 b	4.3 ab	6.5 ab	76.8
Quadris 2.08 SC 6.0 fl oz	0.3 b	4.3 ab	2.0 d	77.0
Veltyma 3.34 SC 7.0 fl oz	0.2 b	1.5 c	10.0 a	77.7
Revytek 3.33 SC 8.0 fl oz	0.1 b	2.5 bc	4.0 bcd	79.3
Echo 2.21 SE 36.0 fl oz + Folicur 4.0 fl oz + Topsin 4.5 SC 20.0 fl oz	0.1 b	1.5 c	4.8 bcd	78.5
Delaro Complete 3.83 SC 8.0 fl oz	0.2 b	1.5 c	5.8 bc	79.3
Miravis Neo 2.5 EC 13.7 fl oz	0.2 b	4.0 ab	5.3 bcd	78.7
Topsin 4.5 SC 20.0 fl oz	0.3 b	4.0 ab	4.0 bcd	78.3
P-value[u]	*0.0338*	*0.0042*	*0.0089*	*0.8042*

[z] Fungicide applications were made on 18 Jul at full seed (R3) growth stage and contained a non-ionic surfactant (Preference) at a rate of 0.25% v/v.

[y] Foliar disease severity rated on scale of 0-100% of canopy within a plot with disease symptoms on 31 Aug at full seed growth stage (R6). FLS = frogeye leaf spot.

[x] Defoliation was visually rated on a scale of 0-100% on 31 Aug.

[w] Percent green stem was visually assessed percentage (0-100%) of plans in plot on 26 Sep.

[v] Yields were adjusted to 13% moisture and harvested on 26 Sep.

[u] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

SOYBEAN (*Glycine max* 'AG26XF1')
Sudden death syndrome; *Fusarium virguliforme*

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Evaluation of seed treatment for sudden death syndrome on soybean in central Indiana, 2024 (SOY24-03.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'AG26XF1' was planted in 30-inch row spacing at a rate of 8 seed/ft on 18 April. *Fusarium virguliforme* inoculum was applied at planting at 1.25 g/ft within the seedbed. Seed treatments were applied on seeds before planting. In-furrow and 2x2 applications were applied at planting at 10 gal/A. Fungicide applications were applied on 2 Jul at full bloom (R2) and were applied at 15 gal/A at 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart at 3.6 mph. Disease ratings were assessed on 30 Aug at beginning maturity (R7) growth stage. Sudden death syndrome (SDS) in each plot was rated for disease incidence (DI) as percentage of plants with disease symptoms (0-100%) and disease severity (DS) on a scale of 1-9 where 1 refers to low disease pressure and 9 refers to premature death of the plant. SDS Index (DX) was calculated using the equation: DX = (DI*DS)/9. Ten roots per plot were sampled from border rows at the R4 (full pod) growth stage on 9 Aug, gently washed, and rated for root rot severity on a scale of 0-100%. The two center rows of each plot were harvested on 26 Sept and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for disease development and very little disease developed in plots. Sudden death syndrome (SDS) was present in the trial and reached low severity. There were no significant differences between nontreated control, base, and other seed treatments for SDS index (Table 6). All treatments reduced root rot severity compared to the nontreated control. There was no significant effect of treatment on harvest moisture, test weight, and yield of soybean.

Table 6. valuation of seed treatment on sudden death syndrome, root rot, and yield of soybean.

Treatment, rate/A, and timing[z]	SDS Index[y]	Root rot % severity[x]	Harvest moisture %	Test weight lb / bu	Yield[w] bu / A
Nontreated control	13.2	5.0 a	15.8	52.7	68.1
Base	6.7	1.2 b	15.6	52.3	72.6
ILeVO	2.6	1.3 b	15.9	53.3	71.1
Saltro	3.6	0.9 b	15.6	53.5	68.4
Zeltera	8.6	0.9 b	15.6	53.5	68.5
Base + Xylem Plus in-furrow 32.0 fl oz/A fb Xylem Plus 24.0 fl oz at R2	11.7	1.2 b	16.1	52.8	67.7
Base + Xyway 15.2 fl oz in 2x2	9.9	1.4 b	15.6	53.6	67.2
Base + ILeVO + Ceramax	4.4	0.8 b	16.2	52.9	72.3
P-value[v]	*0.2115*	*0.0053*	*0.5813*	*0.6550*	*0.7201*

[z] Seed treatments were applied on seeds before planting. Base contained Allegiance Fl at 4.0 g ai/100 kg + Stamina at 7.5 g ai/100 kg + Systiva XS Xemium Brand at 5.0 g ai/100 kg + Poncho 600 at 0.11 mg ai/seed. In-furrow and 2x2 applications were applied at planting at 10 gal/A. Xylem plus was applied on 2 Jul at the full bloom (R2) growth stage.
[y] Sudden death syndrome (SDS) Index (DX) calculated using the equation: DX= (DI*DS/9).
[x] Root rot visually assessed as a percentage (0-100%) of dark discoloration on roots on 9 Aug.
[w] Yields were adjusted to 13% moisture and harvested on 26 Sep.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

SOYBEAN (*Glycine max* '24E453N')
Septoria brown spot; *Septoria glycines*

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Comparison of planting dates and seed treatments on soybean in central Indiana, 2024 (SOY24-08.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment design was a split-plot with four replications. The main plot was planting date and sub-plot seed treatments. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar '24E453N' were planted in 30-inch row spacing at a rate of 8 seed/ft. Treatments were a factorial arrangement of four planting dates by four seed treatments. Soybeans were planted on 18 Apr (planting date 1), 2 May (planting date 2), 20 May (planting date 3) and 30 May (planting date 4). Stand counts were assessed at cotyledons expanded/first-node stage (VC/V1) growth stage for each planting date. Disease ratings were assessed on 31 Aug at full seed/beginning maturity (R6/R7) growth stages. Septoria brown spot (SBS) was rated for disease severity by visually assessing the percentage of symptomatic leaf area in the upper and lower canopies. Canopy greenness visually assessed on scale of 0-100% green within a plot on 31 Aug. Ten roots were sampled for outer rows of each plot on Sep 11 at the beginning maturity/full maturity (R7/R8) growth stages and rated for root rot severity on a scale of 0-100% and averaged before analysis. The two center rows of each plot were harvested on 3 Oct and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

In 2024, weather conditions were not favorable for disease development and very little to moderate disease developed in plots. No significant interactions were observed between seed treatments on root rot therefore main effects of planting date and seed treatment were compared (Table 7). Soybean stand was reduced at the planting 18 Apr compared to 2 May, 20 May and 30 of May. The seed treatment CruiserMaxx APX + Thiamethoxam and CruiserMaxx APX had significantly higher stand than the nontreated control and Thiamethoxam. Septoria brown spot (SBS) severity was higher at planting on 18 Apr and 2 May compared to 20 May and 30 May. No significant differences were detected between seed treatments on SBS and canopy greeness. The percentage of green had the highest value on the planting on 30 May as compared to all the earlier planting dates. Root rot severity was significantly lower at the planting on 20 May and 30 May compared to the first planting on 18 April which had the highest root rot severity. There were no significant differences between planting dates and seed treatments on harvest moisture and test weight. Soybean yield was significantly higher at the first planting date (18 Apr) compared to later plantings. No significant differences were detected between seed treatments for yield of soybean.

Table 7. Effect of planting dates and seed treatments on stand count, SBS, canopy greenness, root rot, and yield of soybean.

Planting dates and seed treatment[z]	**Stand count #/A**	**SBS[y] %**	**Canopy[x] % green**	**Root rot[w] %**	**Harvest moisture %**	**Test weight lb/bu**	**Yield[v] bu/A**
Planting date 1 (18 Apr)	61,801 b	4.3 a	84.1 d	7.7 a	11.4	55.0	57.6 a
Planting date 2 (2 May)	81,457 a	3.9 a	87.8 c	4.0 b	11.4	55.2	49.4 b
Planting date 3 (20 May)	89,080 a	1.8 b	96.9 b	2.0 c	10.8	52.0	47.6 b
Planting date 4 (30 May)	92,565 a	1.0 c	100.0 a	0.7 c	11.2	55.2	46.3 b
Nontreated control	69,533 b	2.9	93.2	4.6	10.6	51.6	49.3
CruiserMaxx APX + Thiamethoxam	89,570 a	2.5	91.4	3.7	11.4	55.2	50.0
Thiamethoxam	71,221 b	2.9	91.9	3.0	11.4	55.3	51.0
CruiserMaxx APX, no Thiamethoxam	94,580 a	2.8	92.2	3.2	11.4	55.4	50.5
P-value planting date[u]	*0.0019*	*0.0001*	*0.0001*	*0.0001*	*0.5703*	*0.4756*	*0.0030*
P-value seed treatment	*0.0045*	*0.7108*	*0.5766*	*0.2672*	*0.3140*	*0.3488*	*0.9591*
*P-value planting date*seed treatment*	*0.2587*	*0.7905*	*0.6990*	*0.9180*	*0.3343*	*0.4108*	*0.9385*

[z] Seed treatments applied prior to planting at 10 g AI/100 kg seed. [y] Foliar disease severity rated on scale of 0-100% of canopy within a plot with disease symptoms on 31 Aug. SBS = Septoria brown spot. [x] Canopy greenness visually assessed on scale of 0-100% green within a plot on 31 Aug. [w] Root rot visually assessed as a percentage (0-100%) of dark discoloration on 10 roots per plot and was then averaged on Sep 11 at the beginning maturity/full maturity (R7/R8) growth stages. [v] Yields were adjusted to 13% moisture and harvest on 3 Oct. [u] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

SOYBEAN (*Glycine max* 'P29A19E')
Septoria brown spot; *Septoria glycines*
Frogeye leaf spot; *Cercospora sojina*

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Frogeye leaf spot model evaluation for fungicide application in soybean in central Indiana, 2024 (SOY24-12.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was soybean. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'P29A19E' was planted in 30-inch row spacing at a rate of 140,000 seed/A on 8 May. All fungicide were applied at 15 gal/A and 40 psi using either a Lee self-propelled sprayer (R3) or a CO_2 backpack spray at (R5) equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicide applications were applied on 18 Jul beginning pod (R3) and 30% model threshold; on 1 Aug at beginning seed (R5) at the 40% model threshold; and no application was made for the 50% model threshold. Foliar disease ratings were rated on 31 Aug. Septoria brown spot (SBS) and frogeye leaf spot (FLS) were rated for disease severity by visually assessing the percentage of symptomatic leaf area in the canopy. The two center rows of each plot were harvested on 3 Oct and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable disease development and very little disease developed in plots. Septoria brown spot (SBS) and frogeye leaf spot (FLS) were present in the trial, with SBS as the most prominent disease. All fungicide treatments significantly reduced SBS compared to nontreated control and 50% threshold with no application (Table 8). Application at both the R3 and at 30% threshold increased canopy greenness compared to the nontreated control, but was not significantly different from application at 40% threshold or no application at 50%. No significant differences between treatments were observed for harvest moisture, test weight, and yield of soybean.

Table 8. Effect of treatments on foliar diseases, canopy greenness, and yield of soybean.

Treatment, rate/A, and timing [z]	**SBS Severity** [y] **%**	**FLS Severity** [y] **%**	**Canopy green** [x] **%**	**Harvest moisture %**	**Test weight lb/bu**	**Yield** [w] **bu/A**
Nontreated control	11.3 a	0.5	81.3 c	13.1	55.3	75.5
Revytek at 8.0 fl oz at R3	1.0 c	0.3	85.8 a	13.0	55.0	77.6
Revytek at 8.0 fl oz at Frogspotter 30% applied at R3	0.9 c	0.3	85.0 ab	12.9	54.9	77.8
Revytek at 8.0 fl oz at Frogspotter 40% applied at R5	1.5 c	0.1	82.5 bc	12.7	55.5	76.2
Revytek at 8.0 fl oz at Frogspotter 50% no application	6.3 b	0.4	83.8 abc	12.9	55.2	75.1
P-value [v]	*0.0005*	*0.1366*	*0.0161*	*0.7529*	*0.7504*	*0.6836*

[z] Fungicides were applied on 18 July for milk (R3) growth stages and 30% threshold, and 1 Aug at the dent (R5) growth stages for the 40% threshold, no application made for 50% threshold. All treatments contained a non-ionic surfactant (Preference) at a rate of 0.25% v/v.

[y] Foliar disease severity rated on scale of 0-100% of canopy within a plot with disease symptoms on 31 Aug. FLS was rated in the upper canopy and SBS was rated in the lower canopy. SBS = Septoria brown spot. FLS=frogeye leaf spot.

[x] Canopy greenness visually assessed on scale of 0-100% green of the plot as a whole on 31 Aug.

[w] Yields were adjusted to 13% moisture and harvested on 3 Oct.

[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

SOYBEAN (*Glycine max* 'LGS3253XF')
Seedling disease; *Pythium sylvaticum*

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Evaluation of seed treatment for Pythium in soybean in central Indiana, 2024 (SOY24-13.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'LGS3253XF' was planted in 30-inch row spacing at a rate of 8 seed/ft on 13 May. Seed treatments were applied by cooperator. *Pythium sylvaticum* inoculum was applied at planting at 1.25 g/ft within the seedbed. Stand counts were assessed on 1 Jul at silk (R1) growth stage. The two center rows of each plot were harvested on 3 Oct and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable disease development and very little disease developed in plots. There was no significant effect of seed treatment on the stand count (Table 9). There was no significant difference between seed treatments on harvest moisture, test weight, or yield of soybean.

Table 9. Effect of treatment on stand count and yield of soybean.

Treatment[z]	**Stand count #/A**[y]	**Harvest moisture %**	**Test weight lb/bu**	**Yield bu/A**[x]
Nontreated, inoculated control	99,970	12.8	54.2	71.3
Accerleron	118,483	12.3	54.5	72.7
Intego Suite	112,167	12.6	54.5	71.6
Zeltera Suite	107,158	13.2	54.0	74.7
Cruiser Maxx Vibrance	103,673	13.8	54.5	69.5
Cruiser Maxx APX (Vayantis)	107,593	12.9	54.1	72.2
P-value[w]	*0.0845*	*0.1356*	*0.6040*	*0.4966*

[z] Seed treatments were applied by cooperator.
[y] Stand counts were assessed on 1 Jul at silk (R1) growth stage.
[x] Yields were adjusted to 13% moisture and harvest on 3 Oct.
[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

SOYBEAN (*Glycine max*)
Sudden death syndrome; *Fusarium virguliforme*

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Planting date and sulfur evaluation for sudden death syndrome on soybean in central Indiana, 2024 (SOY24-19.ACRE)

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experimental design was split-plot with four replications. The main plot was planting date (April and May) and sub-plots were a factorial arrangement of inoculation (nontreated and inoculated) by treatment (nontreated control, ammonium sulfate, ammonium thiosulfate, and calcium sulfate). Plots were 10-ft wide and 30-ft long, consisting of four rows, and the two center rows were used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean seeds were planted in 30-inch row spacing at a rate of 140,00 seeds/A. Soybeans were planted on 18 Apr (April planting) and on 13 May (May planting). *Fusarium virguliforme* was inoculated at planting at 1.25 g/ft. Sulfur treatments were applied on 18 Apr and 14 May following planting, with a resultant sulfur rate of 20 lb/A. Ammonium sulfate 83 lb/A and calcium sulfate at 117 lb/A were hand-applied; ammonium thiosulfate was applied at 6.9 gal/A at 15 GPA at 28-29 psi using a CO_2 backpack sprayer equipped with a 10-ft boom, fitted with eight TJ-VS 8002 nozzles spaced 15-in. apart at 3 mph. Disease ratings were assessed on 30 Aug at full seed (R6) growth stage. SDS in each plot was rated for disease incidence (DI) a percentage of plants with disease symptoms (0-100%) and disease severity (DS) on a scale of 1-9 where 1 refers to low disease pressure and 9 refers to premature death of the plant. SDS Index (DX) was then calculated using the equation: DX= (DI x DS/9). Canopy greenness visually assessed on scale of 0-100% green of the plot as a whole on 30 Aug. The two center rows of each plot were harvested on 3 Oct and yields were adjusted to 13% moisture. All disease and yield data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for diseases and very little disease developed in trial. Sudden death syndrome (SDS) was present at a low severity. There was only one significant interaction between inoculum and treatment for yield, therefore main effects are shown for simplicity (Table 10). There were no significant treatment effects for SDS index. Canopy greenness at R6 was significantly higher for May 13 planted soybeans compared to Apr 18 planted soybeans, but there were no significant differences between inoculation or sulfur treatments. There were no significant effects of planting date or inoculation on harvest moisture, test weight and soybean yield. Ammonium sulfate increased soybean yield over nontreated and ammonium thiosulfate, but was not significantly different from calcium sulfate.

Table 10. Effect of planting date, inoculation, sulfur treatment on sudden death syndrome and yield of soybean.

Treatments and rate/A[z]	SDS Index[y]	Canopy green[x] %	Harvest moisture %	Test weight lb/bu	Yield[w] bu/A
April planting (Apr 18)	1.4	87.0 b	10.9	54.9	82.9
May planting (May 13)	0.6	93.9 a	10.9	54.9	82.0
Non-inoculated	1.1	90.2	10.9	55.0	82.7
Inoculated	0.8	90.7	11.0	54.8	82.2
Nontreated control	1.2	90.6	10.9	54.9	80.6 b
Ammonium sulfate 83.0 lb	0.7	90.5	11.0	55.0	85.6 a
Ammonium thiosulfate 6.9 gal	1.3	90.6	11.0	54.7	81.3 b
Calcium sulfate 117.0 lb	0.8	90.0	10.8	54.9	82.2 ab
P-value *planting date*[v]	*0.4677*	*0.0017*	*0.9124*	*0.9593*	*0.6005*
P-value *inoculum*	*0.2751*	*0.4102*	*0.3700*	*0.1895*	*0.6979*
P-value *sulfur treatment*	*0.2869*	*0.9002*	*0.2546*	*0.5942*	*0.0502*
P- value *planting date*treatment*	*0.9548*	*0.2635*	*0.7340*	*0.2606*	*0.9574*
P-value *planting date*inoculum*	*0.4248*	*0.7135*	*0.5066*	*0.8129*	*0.6153*
P-value *inoculum*treatment*	*0.3094*	*0.4396*	*0.6687*	*0.6429*	*0.0001*
P-value *planting date*inoculum*treatment*	*0.4470*	*0.8605*	*0.2919*	*0.8781*	*0.2364*

[z] *Fusarium virguliforme* grown on sorghum were inoculated at planting. Sulfur treatments were applied by hand following planting with a resultant sulfur rate of 20 lb/A.0. [y] SDS Index (DX) calculated using the equation: DX= (DI x DS/9). [x] Canopy greenness visually assessed on scale of 0-100% green of the plot as a whole on 30 Aug. [w] Yields were adjusted to 13% moisture and harvested on 3 Oct. [v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

SOYBEAN (*Glycine max* 'P29A19E')
Septoria brown spot; *Septoria glycines*
Frogeye leaf spot; *Cercospora sojina*

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Evaluation of fungicides for foliar diseases in soybean in central Indiana, 2024 (SOY24-22.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'P29A19E' was planted in 30-inch row spacing at a rate of 140,000 seed/A on 8 May. All fungicide were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicides were applied on 17 Jun at V4 and 18 Jul at the beginning pod (R3) growth stage. Foliar disease ratings were rated on 30 Aug. Septoria brown spot (SBS) and frogeye leaf spot (FLS) were rated for disease severity by visually assessing the percentage of symptomatic leaf area in the canopy. The two center rows of each plot were harvested on 26 Sep and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for disease development. Septoria brown spot (SBS) and frogeye leaf spot (FLS) were present in the trial. All fungicide treatments significantly reduced SBS and FLS over nontreated control (Table 11). There was no significant effect of treatment on percent canopy greenness on 30 Aug. There was no significant effect of treatment on harvest moisture, test weight, and yield of soybean.

Table 11. Effect of treatment on foliar disease severity, canopy greenness, and yield of soybean.

Treatment, rate/A, and timing [z]	SBS[y] %	FLS[y] %	Canopy[x] green %	Harvest moisture %	Test weight lb/bu	Yield[w] bu/A
Nontreated control	10.3 a	1.1 a	82.5	15.0	55.2	65.3
Lucento 4.17 SC 5.0 fl oz at R3	0.9 b	0.2 b	85.0	15.1	55.2	65.6
Adastrio 4.0 SC 8.0 fl oz at R3	1.1 b	0.3 b	82.5	15.0	54.8	64.2
Topguard EQ 4.29 SC 7.0 fl oz at V4 fb Lucento 4.17 SC 5.0 fl oz at R3	1.3 b	0.2 b	82.5	15.2	54.6	66.9
Topguard EQ 4.29 SC 7.0 fl oz at V4 fb Adastrio 4.0 SC 8.0 fl oz at R3	1.3 b	0.3 b	86.3	14.7	53.8	63.4
Delaro Complete 3.82 SC 8.0 fl oz at R3	1.0 b	0.2 b	86.3	15.2	54.5	67.3
Revytek 4.44 SC 8.0 fl oz at R3	0.6 b	0.2 b	86.3	15.2	54.7	64.7
P-value[v]	*0.0001*	*0.0080*	*0.5161*	*0.4763*	*0.3004*	*0.9546*

[z] Fungicides were applied on 17 Jun at V4 and 18 July at the beginning pod (R3) growth stage, and all treatments contained a non-ionic surfactant (Preference) at a rate of 0.25% v/v.

[y] Foliar disease severity rated on scale of 0-100% of canopy within a plot with disease symptoms. SBS = Septoria brown spot. FLS=frogeye leaf spot.

[x] Canopy greenness visually assessed on scale of 0-100% green within a plot.

[w] Yields were adjusted to 13% moisture and harvest on 26 Sep.

[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

SOYBEAN (*Glycine max* 'P29A19E')
Frogeye leaf spot; *Cercospora sojina*
Septoria brown spot; *Septoria glycines*

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Evaluation of fungicides for foliar diseases in soybean in central Indiana, 2024 (SOY24-27.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'P29A19E' was planted in 30-inch row spacing at a rate of 8 seed/ft on 13 May. Xyway LFR treatments were applied 2x2 at planting at 10 gal/A. All foliar fungicide were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Foliar fungicides were applied on 18 Jul at beginning pod (R3) growth stage. Foliar disease ratings were rated on 30 Aug. Frogeye leaf spot (FLS) and Septoria brown spot (SBS) were rated for disease severity by visually assessing the percentage of symptomatic leaf area in the canopy. Percent canopy greenness was visually assessed percentage (0-100%) of plans in plot on 26 Sep. The two center rows of each plot were harvested on 26 Sep and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for disease development. Septoria brown spot (SBS) and frogeye leaf spot (FLS) were present in the trial, but only reached low levels. All treatments significantly reduced SBS and FLS over nontreated control (Table 12). There was no significant effect of treatment on percent canopy greenness on 30 Aug. There was no significant effect of treatment on harvest moisture, and yield of soybean. Xyway LFR 10.5 fl oz 2x2 had significantly higher test weight than Xyway LFR 10.5 fl oz 2x2 followed by (fb) Lucento 5.0 fl oz at R3 and Xyway LFR 10.5 fl oz 2x2 fb Lucento 5.0 fl oz at R3, but was not significantly different from nontreated control or Xyway LFR 15.2 2x2. There was no significant effect of treatment on yield of soybean.

Table 12. Effect of treatment on foliar diseases, canopy greenness, and yield of soybean.

Treatment, rate/A, and timing [z]	SBS[y] %	FLS[y] %	Canopy green[x] %	Harvest moisture %	Test weight lb/bu	Yield[w] bu/A
Nontreated control	11.3 a	0.5 a	82.5	15.3	54.5 ab	67.1
Xyway LFR 10.5 fl oz 2x2 at plant	2.8 b	0.1 b	82.5	14.7	55.0 a	61.7
Xyway LFR 10.5 fl oz 2x2 at plant fb Lucento 5.0 fl oz at R3	0.7 b	0.0 b	82.5	14.8	54.4 bc	61.0
Xyway LFR 15.2 fl oz 2x2 at plant	3.3 b	0.1 b	82.5	15.5	54.8 ab	64.7
Xyway LFR 15.2 fl oz 2x2 at plant fb Lucento 5.0 fl oz at R3	0.4 b	0.0 b	85.0	15.1	54.0 c	61.6
P-value[v]	*0.0002*	*0.0048*	*0.5165*	*0.5990*	*0.0155*	*0.5652*

[z] Fungicides were applied in 2x2 at planting on 13 May and 18 Jul at the R3 (beginning pod) growth stage. fb=followed by.
[y] Foliar disease severity rated on scale of 0-100% of canopy within a plot with disease symptoms on 30 Aug. SBS = Septoria brown spot; FLS=Frogeye leaf spot.
[x] Canopy greenness visually assessed on scale of 0-100% green within a plot on 30 Aug.
[w] Yields were adjusted to 13% moisture and harvest on 26 Sep.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

WHEAT (*Triticum aestivum* 'P25R40')
Fusarium head blight; *Fusarium graminearum*

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Evaluation of foliar fungicide for Fusarium head blight management in central Indiana, 2024 (WHT24-01.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 7.5-ft wide and 20-ft long, consisted of 12 rows spaced 7.5 in. apart, and the center of each plot was used for evaluation. The previous crop was corn. On 26 Oct 2023 wheat cultivar 'P25R40' was drilled at 7.5 in. spacing. All fungicide applications were applied at 15 gal/A and 40 psi using a CO_2 backpack sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart and directed forward and backward at 45-degree angle. Fungicides were applied on 15 May and 20 May at the Feekes growth stage 10.5.1 and 10.5.1 + 5 days, respectively. All plots were inoculated with a mixture of isolates of *Fusarium graminearum* endemic to Indiana on 15 May. The spore suspension (50,000 spores/ml) was applied at 300 ml/plot with the CO_2 backpack sprayer. Disease ratings were assessed on 29 May. Fusarium head blight (FHB) incidence was measured as the number of infected heads out of 60 plants in each plot and calculated as a percentage. FHB severity was rated by visually assessing the percentage of the infected head, FHB index was calculated as: (% FHB incidence multiplied by average FHB severity)/100 per plot. Values for each plot were averaged before analysis. The eight center rows of each plot were harvested with a Kincaid plot combine on 28 Jun and yields were adjusted to 13.5% moisture. A subsample of grain was taken from each plot and partitioned for deoxynivalenol (DON) analysis completed by the University of Minnesota DON testing lab and to determine FDK by visually assessing the percentage (0-100) of the infected heads. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for Fusarium head blight (FHB). FHB incidence, severity and index were reduced by all fungicide treatments over the nontreated control except Miravis Ace 5.2SC at 10.5.1 for FHB incidence and Prosaro 421SC at 10.5.1 for FHB severity, but these were not significantly different from all other fungicide treatments or timings (Table 13). The percent of FDK visual was significantly reduced by all fungicide programs over nontreated control, except Prosaro 421SC, Miravis Ace 5.2SC, and Miravis Ace 5.2SC fb Tebuconazole 10.5.1 +5 days. The concentration of deoxynivalenol (DON) was significantly reduced over nontreated control by all treatments. There was no significant difference between treatments for yield of wheat.

Table 13. Effect of fungicide on Fusarium head blight (FHB), Fusarium damaged kernels (FDK), deoxynivalenol (DON), and yield of wheat.

Treatment, rate/A, and timing[z]	FHB Incidence %[y]	FHB Severity %[x]	FHB Index[w]	FDK[v] %	DON[u] ppm	Yield[t] bu/A
Nontreated control	25.8 a	13.0 a	3.5 a	11.8 a	4.0 a	77.8
Prosaro 421SC 6.5 fl oz at 10.5.1	12.1 bc	9.5 ab	1.4 b	9.5 ab	1.8 bc	82.9
Miravis Era 13.5 fl oz at 10.5.1	12.1 bc	7.5 bc	1.1 b	5.8 c	0.8 c	84.1
Miravis Ace 5.2SC 13.7 fl oz at 10.5.1	17.1 ab	7.2 bc	1.4 b	9.8 ab	2.4 b	86.0
Prosaro Pro 400SC 10.3 fl oz at 10.5.1	7.5 bc	6.3 bc	0.7 b	8.5 bc	1.1 c	89.8
Sphaerex 2.50SC 7.3 fl oz at 10.5.1	10.8 bc	7.8 bc	0.8 b	7.0 bc	0.9 c	85.5
Miravis Ace 5.2SC 13.7 fl oz at 10.5.1 fb Prosaro Pro 400SC 10.3 fl oz at 10.5.1 +5d	7.1 c	4.0 c	0.3 b	7.5 bc	0.8 c	84.9
Miravis Ace 5.2SC 13.7 fl oz at 10.5.1 fb Sphaerex 2.50SC 7.3 fl oz at 10.5.1 +5d	7.9 bc	4.7 bc	0.4 b	8.0 bc	0.9 c	83.4
Miravis Ace 5.2SC 13.7 fl oz at 10.5.1 fb Tebuconazole 4.0 fl oz at 10.5.1 +5d	11.7 bc	4.6 c	0.6 b	9.3 ab	1.3 c	94.7
P-value[s]	*0.0155*	*0.0203*	*0.0025*	*0.0268*	*0.0001*	*0.3912*

[z] Fungicide treatments applied on 15 May and 20 May at Feekes growth stage 10.5.1 and 10.5.1 + 5 days, respectively. All treatments contained a non-ionic surfactant (Preference) at a rate of 0.125% v/v. All plots were inoculated with a mixture of isolates of *Fusarium graminearum* endemic to Indiana on 23 May with a spore suspension (50,000 spores/ml) applied at 300 ml/plot with handheld sprayer on 15 May. [y] Fusarium head blight (FHB) incidence was measured as the number of infected heads out of 60 plants in each plot and calculated as a percentage on 29 May. [x] FHB severity was rated by visually assessing the percentage of the infected head. [w] FHB index was calculated as: (% FHB incidence multiplied by average FHB severity)/100 per plot. [v] Visual assessment of percentage of Fusarium damaged kernels (FDK) was performed. [u] Analysis of the mycotoxin deoxynivalenol (DON) completed by the University of Minnesota DON Testing Lab. [t] Yields were adjusted to 13.5% moisture and harvested on 28 Jun. [s] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

WHEAT (*Triticum aestivum* 'P25R40' and 'P25R61')
Fusarium head blight; *Fusarium graminearum*

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Integrated management of Fusarium head blight (FHB) of wheat in central Indiana, 2024 (WHT24-02.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 7.5-ft wide and 20-ft long, consisted of 12 rows spaced 7.5 in. apart, and the center of each plot was used for evaluation. The previous crop was corn. On 26 Oct 2023 wheat cultivars 'P25R40' and 'P25R61' were drilled at 7.5 in. spacing. All fungicide applications were applied at 15 gal/A and 40 psi using a CO_2 backpack sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart and directed forward and backward at 45-degree angle. Fungicides were applied on 15 May at the Feekes growth stage 10.5.1. All plots were inoculated with a mixture of isolates of *Fusarium graminearum* endemic to Indiana on 16 May. The spore suspension (50,000 spores/ml) was applied at 300 ml/plot with the CO_2 backpack sprayer. Disease ratings were assessed on 29 May. Fusarium head blight (FHB) incidence was measured as the number of infected heads out of 60 plants in each plot and calculated as a percentage. FHB severity was rated by visually assessing the percentage of the infected head, FHB index was calculated as: (% FHB incidence multiplied by average FHB severity)/100 per plot. Values for each plot were averaged before analysis. The eight center rows of each plot were harvested with a Kincaid plot combine on 28 Jun and yields were adjusted to 13.5% moisture. A subsample of grain was taken from each plot and partitioned for deoxynivalenol (DON) analysis completed by the University of Minnesota DON testing lab and to determine Fusarium damaged kernels (FDK) by visually assessing the percentage (0-100) of the infected heads. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for Fusarium head blight (FHB). FHB was the most prominent disease in the trial. The main effects of cultivar and fungicide treatment are presented (Table 14). FHB index, DON, and yield were lowest in the resistant cultivar P25R61. Test weight was significantly higher in P25R40 as compared to P25R61. FHB index was reduced by all fungicide treatments over nontreated, non-inoculated control, but Prosaro was not significant from nontreated, inoculated control. Applications of Prosaro 421SC, Prosaro Pro 400SC, and Sphaerex 2.50SC resulted in the lowest percent FDK. The concentration of deoxynivalenol (DON) was significantly reduced by all the fungicides over the nontreated, inoculated and non-inoculated controls. All fungicide treatments increase harvest moisture and test weight over the nontreated controls, except Prosaro and nontreated, inoculated control. There were no significant differences in treatment for yield of wheat.

Table 14. Effect of cultivar and fungicide on Fusarium head blight (FHB), Fusarium damaged kernels (FDK), deoxynivalenol (DON), and yield of wheat.

Treatment and rate/A[z]	FHB[y] Index	FDK[x] %	DON[w] ppm	Moisture %	Test weight lb/bu	Yield[v] bu/A
Cultivar						
P25R40 (susceptible)	1.6 a	11.4	2.7 a	16.4	56.1 a	86.6 a
P25R61 (resistant)	0.8 b	12.2	1.1 b	16.4	55.3 b	66.8 b
Fungicide						
Nontreated, inoculated control	1.5 ab	14.1 ab	3.6 a	16.2 b	55.4 bc	70.9
Nontreated, non-inoculated control	2.1 a	15.8 a	3.8 a	16.1 b	55.1 c	79.4
Prosaro 421SC 6.5 fl oz	1.1 bc	9.5 cd	1.2 b	16.5 a	55.8 ab	77.8
Miravis Ace 5.2SC 13.7 fl oz	0.9 c	12.5 bc	1.5 b	16.5 a	55.9 a	76.1
Prosaro Pro 400SC 10.3 fl oz	0.8 c	10.4 cd	1.2 b	16.6 a	56.1 a	75.1
Sphaerex 2.50SC 7.3 fl oz	0.8 c	8.5 d	1.0 b	16.6 a	56.0 a	81.0
P-value *cultivar*[u]	*0.0001*	*0.4081*	*0.0001*	0.3427	0.0001	*0.0001*
P-value *treatment*	*0.0005*	*0.0002*	*0.0001*	0.0001	0.0014	*0.6317*
P-value *cultivar*treatment*	*0.4272*	*0.1842*	*0.0128*	0.8080	0.1615	*0.7108*

[z] Fungicide treatments applied on 15 May at Feekes growth stage 10.5. 1 and contained a non-ionic surfactant (Preference) at a rate of 0.125% v/v. All plots inoculated with *Fusarium graminearum* spore suspension (50,000 spores/ml) after the treatment at Feekes 10.5.1. Spore suspension applied at 300 ml/plot with handheld sprayer on 16 May. [y] FHB index was calculated as: (% FHB incidence multiplied by average FHB severity)/100 per plot. [x] Visual assessment of percentage (0-100%) of Fusarium damaged kernels (FDK). [w] Analysis of the mycotoxin deoxynivalenol (DON) completed by the University of Minnesota DON Testing Lab. [v]Yields were adjusted to 13.5% moisture and harvested on 28 Jun. [u] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

WHEAT (*Triticum aestivum* 'P25R40')
Fusarium head blight; *Fusarium graminearum*
Leaf blotch; *Septoria tritici/Stagnospora nodorum*
Leaf rust; *Puccinia triticina*

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Evaluation of foliar fungicides for wheat disease management in central Indiana, 2024 (WHT24-05.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 7.5-ft wide and 20-ft long, consisted of 12 rows spaced 7.5 in. apart, and the center of each plot was used for evaluation. The previous crop was corn. On 26 Oct 2023 wheat cultivar 'P25R40' was drilled at 7.5 in. spacing. All fungicide applications were applied at 15 gal/A and 40 psi using a CO_2 backpack sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart and directed forward and backward at 45-degree angle. Fungicides were applied on 30 Apr at the Feekes growth stage 8 and 15 May at Feekes 10.5.1. Disease ratings were assessed on 29 May. Fusarium head blight (FHB) incidence was measured as the number of infected heads out of 60 plants in each plot and calculated as a percentage. FHB severity was rated by visually assessing the percentage of the infected head, FHB index was calculated as: (% FHB incidence multiplied by average FHB severity)/100 per plot. Values for each plot were averaged before analysis. The eight center rows of each plot were harvested with a Kincaid plot combine on 28 Jun and yields were adjusted to 13.5% moisture. A subsample of grain was taken from each plot and partitioned for deoxynivalenol (DON) analysis completed by the University of Minnesota DON testing lab and to determine Fusarium damages kernels (FDK) by visually assessing the percentage (0-100) of the infected heads. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for Fusarium head blight (FHB), but very little foliar disease developed in trial. There were no significant differences between treatments for leaf blotch (Stag/Sept) and FHB index (Table 15). All treatments reduced leaf rust severity compared to the nontreated control. No significant differences were detected between treatments for FDK and wheat yield. The concentration of deoxynivalenol (DON) was reduced only by the application of Adastrio 3.5SC at Feekes 8 growth stage.

Table 15. Effect of fungicide on Fusarium head blight (FHB), Fusarium damaged kernels (FDK), deoxynivalenol (DON), and yield of wheat.

Treatment, rate/A, and timing[z]	Stag/Sept % severity[y]	Rust % severity[y]	FHB Index[x]	FDK %[w]	DON ppm[v]	Yield[u] bu/A
Nontreated control	0.1	0.1 a	2.2	1.5	5.9 a	59.6
Nexicor 2.96 EC 7.0 fl oz at Feekes 8	0.1	0.0 b	1.4	4.3	5.8 a	62.5
Topguard 1.04 SC 10.0 fl oz at Feekes 8	0.0	0.0 b	2.0	2.0	5.3 a	63.2
Priaxor 4.17 EC 4.0 fl oz at Feekes 8	0.1	0.0 b	1.3	2.0	4.7 a	62.3
Trivapro 2.21 SE 9.4 fl oz at Feekes 8	0.1	0.0 b	1.1	2.5	5.0 a	57.9
Delaro 325 SC 8.0 fl oz at Feekes 8	0.0	0.0 b	2.2	1.0	4.5 a	59.6
Quilt Xcel 2.2 SE 10.5 fl oz at Feekes 8	0.1	0.0 b	1.5	2.5	5.9 a	58.9
Tilt 3.6 ES 4.0 fl oz at Feekes 8	0.1	0.0 b	2.3	6.0	5.4 a	56.4
Headline SC 6.0 fl oz at Feekes 8	0.1	0.0 b	2.0	2.0	5.3 a	57.8
Adastrio 3.5 SC 6.0 fl oz at Feekes 8	0.0	0.0 b	0.8	0.9	2.1 b	66.7
Prosaro 1.76 SC 6.5 fl oz at Feekes 10.5.1	0.2	0.0 b	1.9	2.0	5.8 a	56.7
P-value[t]	*0.9319*	*0.0096*	*0.7540*	*0.2035*	*0.0091*	*0.1226*

[z] Fungicides were applied on 30 Apr at the Feekes growth stage 8 and 15 May at Feekes 10.5.1. All treatments contained a non-ionic surfactant (Preference) at a rate of 0.125% v/v.
[y] Foliar disease severity was rated by visually assessing the percentage (0-100%) of symptomatic leaf area on the flag leaf of five leaves per plot. Stag/Sept=*Stagnospora nodorum*/*Septoria tritici* (leaf blotch).
[x] FHB index was calculated as: (% FHB incidence multiplied by average FHB severity)/100 per plot.
[w] Visual assessment of percentage (0-100%) of Fusarium damaged kernels (FDK) was performed on 12 Jun.
[v] Analysis of the mycotoxin deoxynivalenol (DON) completed by the University of Minnesota DON Testing Lab.
[u] Yields were adjusted to 13.5% moisture and harvested on 28 Jun.
[t] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

WHEAT (*Triticum aestivum* 'P25R40')
Fusarium head blight; *Fusarium graminearum*

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Evaluation of biological fungicides for Fusarium head blight of wheat in central Indiana, 2024 (WHT24-07.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 7.5-ft wide and 20-ft long, consisted of 12 rows spaced 7.5 in. apart, and the center of each plot was used for evaluation. The previous crop was corn. On 26 Oct 2023 wheat cultivar 'P25R40' was drilled at 7.5 in. spacing. All fungicide applications were applied at 15 gal/A and 40 psi using a CO_2 backpack sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart and directed forward and backward at 45-degree angle. Fungicides were applied on 15 May at the Feekes growth stage 10.5.1. All plots were inoculated with a mixture of isolates of *Fusarium graminearum* endemic to Indiana on 15 May. The spore suspension (50,000 spores/ml) was applied at 300 ml/plot with the CO_2 backpack sprayer. Disease ratings were assessed on 29 May. Fusarium head blight (FHB) incidence was measured as the number of infected heads out of 60 plants in each plot and calculated as a percentage. FHB severity was rated by visually assessing the percentage of the infected head, FHB index was calculated as: (% FHB incidence multiplied by average FHB severity)/100 per plot. Values for each plot were averaged before analysis. The eight center rows of each plot were harvested with a Kincaid plot combine on 28 Jun and yields were adjusted to 13.5% moisture. A subsample of grain was taken from each plot and partitioned for deoxynivalenol (DON) analysis completed by the University of Minnesota DON testing lab and to determine Fusarium damages kernels (FDK) by visually assessing the percentage (0-100%) of the infected heads. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for Fusarium head blight (FHB). Fusarium head blight (FHB) incidence was significantly increased with Pacesetter over nontreated control (Table 16). No significant differences between treatments were detected for FHB severity. FHB index was significantly higher with Pacesetter over other treatments, but not significantly different from the nontreated control. The concentration of deoxynivalenol (DON) was significantly reduced by Prosaro application as compared to the nontreated control. There were no differences detected between treatments for FDK and wheat yield.

Table 16. Effect of fungicide on Fusarium head blight (FHB), Fusarium damaged kernels (FDK), deoxynivalenol (DON), and wheat yield.

Treatment and rate/A[z]	FHB % incidence[y]	FHB % severity[x]	FHB Index[w]	FDK %[v]	DON (ppm)[u]	Yield bu/A[t]
Nontreated control	14.6 bc	8.4	1.3 ab	1.5	4.0 a	64.4
Prosaro 421SC 8.2 fl oz	8.8 c	6.5	0.6 b	0.6	1.3 b	71.9
ChampION 50 WP 1.5 lb	15.9 ab	7.2	1.2 b	2.5	3.8 a	72.9
Pacesetter WS 13.0 fl oz	22.5 a	8.7	2.0 a	2.0	4.3 a	71.8
Sonata 1.0 qt	13.3 bc	8.6	1.1 b	1.9	3.7 a	66.8
Actinovate AG 12.0 fl oz	17.1 ab	6.5	1.1 b	2.0	4.1 a	81.0
P-value[s]	*0.0204*	*0.4073*	*0.0472*	*0.2309*	*0.0107*	*0.0630*

[z] Fungicide treatments applied on 15 May at Feekes growth stage 10.5.1. All plots were inoculated with a mixture of isolates of *Fusarium graminearum* endemic to Indiana with a spore suspension (50,000 spores/ml) applied at 300 ml/plot with handheld sprayer on 15 May.
[y] Fusarium head blight (FHB) incidence was measured as the number of infected heads out of 60 plants in each plot and calculated as a percentage on 29 May.
[x] FHB severity was rated by visually assessing the percentage of the infected head
[w] FHB index was calculated as: (% FHB incidence multiplied by average FHB severity)/100 per plot.
[v] Visual assessment of percentage of Fusarium damaged kernels (FDK) was performed 11 Jul.
[u] Analysis of the mycotoxin deoxynivalenol (DON) completed by the University of Minnesota DON Testing Lab.
[t] Yields were adjusted to 13.5% moisture and harvested on 28 Jun.
[s] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

WHEAT (*Triticum aestivum* 'P25R40')
Leaf blotch; *Septoria tritici/Stagnospora nodorum*

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Efficacy of Adastrio and Topguard for foliar wheat disease in central Indiana, 2024 (WHT24-08.ACRE).

A trial was established at the Purdue Agronomy Center for Research and Education (ACRE) in Tippecanoe County, IN. The experiment was a randomized complete block design with four replications. Plots were 7.5-ft wide and 20-ft long, consisted of 12 rows spaced 7.5 in. apart, and the center of each plot was used for evaluation. The previous crop was corn. On 26 Oct 2023 wheat cultivar 'P25R40' was drilled at 7.5 in. spacing. All fungicide applications were applied at 15 gal/A and 40 psi using a CO_2 backpack sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart and directed forward and backward at 45-degree angle. Fungicides were applied on 21 Mar and 15 May at greenup and Feekes 10.5.1, respectively. Disease ratings were assessed on 29 May. Disease severity on leaves were rated by visually assessing the percentage of symptomatic leaf tissue on five flag leaves per plot for leaf blotch. Values for each plot were averaged before analysis. The eight center rows of each plot were harvested with a Kincaid plot combine on 28 Jun and yields were adjusted to 13.5% moisture. A subsample of grain was taken from each plot and partitioned for deoxynivalenol (DON) analysis completed by the University of Minnesota DON testing lab and to determine FDK by visually assessing the percentage (0-100) of the infected heads. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=.,05).

In 2024, weather conditions were not favorable for foliar diseases. Low levels of leaf blotch were detected. There were no differences in treatments from nontreated control for severity of leaf blotch (Stag/Sept) and FDK (Table 17). The concentration of deoxynivalenol (DON) was significantly reduced over nontreated control by all treatments, except Adastrio applied at greenup. All treatments significantly increased harvest moisture over nontreated control, except Adastrio applied at greenup. There were no significant differences between treatments for test weight and yield of wheat.

Table 17. Effect of fungicide on foliar diseases, Fusarium damaged kernels (FDK), deoxynivalenol (DON), and wheat yield.

Treatment, rate/A, and timing[z]	Stag/Sept[y] % severity	FDK[x] %	DON[w] ppm	Moisture %	Test weight lb/bu	Yield[v] bu/A
Nontreated control	0.1	1.5	6.0 a	15.1 b	55.5	58.0
Adastrio 4.0SC 3.5 fl oz at greenup	0.3	2.0	6.5 a	15.1 b	56.7	53.0
Adastrio 4.0SC 3.5 fl oz at greenup fb Adastrio 4.0SC 3.5 fl oz at Feekes 10.5.1	0.1	0.9	3.4 bc	15.6 a	56.6	61.3
Topguard SC 4.29 SC 5.0 fl oz at greenup fb Adastrio 4.0SC 5.0 fl oz at Feekes 10.5.1	0.0	0.8	2.5 c	15.8 a	56.5	60.4
Topguard SC 4.29 SC 5.0 fl oz at greenup fb Topguard SC 4.29 SC 5.0 fl oz at Feekes 10.5.1	0.2	1.4	3.7 b	15.6 a	56.0	55.4
P-value[u]	*0.2487*	*0.3441*	*0.0001*	*0.0036*	*0.5580*	*0.2073*

[z] Fungicide treatments applied on 21 Mar at greenup and 15 May at Feekes 10.5.1. All treatments contained a non-ionic surfactant (Preference) at a rate of 0.25% v/v.

[y] Foliar disease severity was rated by visually assessing the percentage of symptomatic leaf tissues on five flag leaves per plot on 29 May. Stag/Sept=*Stagnospora nodorum*/*Septoria tritici* (leaf blotch).

[x] Visual assessment of percentage of Fusarium damaged kernels (FDK) was performed on a subsample (0-100%).

[w] Analysis of the mycotoxin deoxynivalenol (DON) completed by the University of Minnesota DON Testing Lab.

[v] Yields were adjusted to 13.5% moisture and harvested on 28 Jun.

[u] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (Zea mays 'W2584 VT2P RIB')
Tar spot; *Phyllachora maydis*

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Uniform fungicide comparison for tar spot in corn in northwestern Indiana, 2024 (COR24-02.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for grain corn production in Indiana were followed. Corn hybrid 'W2584VT2P RIB' was planted in 30-inch row spacing at a rate of 34,000 seeds/A on 23 May. The field was overhead irrigated weekly at 1 in. unless weekly rainfall was 1 in. or higher to encourage disease. All foliar fungicide applications were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicides were applied on 7 Aug at silking (R1) growth stage and three weeks after treatments (WAT) on 29 Aug at milk (R3) growth stage. Disease ratings were assessed on 16 Sep at dent (R5) growth stage. Tar spot was rated by visually assessing the percentage of stromata per leaf (0-100%) on five plants in each plot at the ear leaf (EL) and ear leaf ±2 (EL±2). The two center rows of each plot were harvested on 21 Oct and yields were adjusted to 15.5% moisture. All disease and yield data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were favorable for disease. Tar spot was the most prominent disease in the trial and reached high severity. All treatments significantly reduced tar spot stromata severity compared to the nontreated control on 16 Sep at the ear leaf and ear leaf ±2 (Table 18). On 16 Sep, Aproach Prima followed by (fb) Headline AMP and Aproach Prima resulted in the lowest level of disease at the EL-2, but were only significantly different from Headline AMP fb Veltyma and Headline AMP followed by Delaro Complete programs. At the ear leaf (EL), Delaro Complete fb Headline AMP resulted in the lowest level of tar spot, but was not significantly different from all other treatments, except the single applications of Veltyma, Aproach Prima, and Miravis Neo; and Headline AMP fb Headline Amp. At the EL+2 all treatments led to 3% or less of tar spot compared to 20% in the nontreated control. There was no significant effect of treatment on harvest moisture and yield of corn.

Table 18. Effect of fungicide programs on tar spot stromata severity, canopy greenness, and yield of corn.

Treatment, rate/A, and timing[z]	Tar spot[y] % El-2	Tar spot[y] % EL	Tar spot[y] % EL+2	Harvest moisture %	Yield[x] bu/A
Nontreated control	23.5 a	23.0 a	20.0 a	16.1	182.3
Veltyma 3.34 S 7.0 fl oz at R1	10.1 b-e	4.4 b-e	2.6 bc	17.1	217.0
Aproach Prima 2.34 SC 6.8 fl oz at R1	5.5 e	5.8 bc	2.6 bc	16.6	209.3
Miravis Neo 2.5 SE 13.7 fl oz at R1	6.3 de	6.0 b	3.1 b	18.4	194.1
Delaro Complete 3.82 SC 8.0 fl oz at R1	7.6 cde	3.6 b-f	2.0 b-e	19.2	195.5
Headline AMP 1.68 SC 10.0 fl oz at R1	9.8 b-e	5.1 bcd	2.5 bcd	18.4	189.4
Veltyma 3.34 S 7.0 fl oz at R1 fb Headline AMP 1.68 SC 10.0 fl oz 3 WAT	9.4 b-e	3.7 b-f	0.9 cde	19.4	201.2
Aproach Prima 2.34 SC 6.8 fl oz at R1 fb Headline AMP 1.68 SC 10.0 fl oz 3 WAT	5.6 e	1.9 ef	0.6 de	17.9	205.5
Miravis Neo 2.5 SE 13.7 fl oz at R1 fb Headline AMP 1.68 SC 10.0 fl oz 3 WAT	8.8 cde	2.6 def	0.5 e	19.6	197.5
Delaro Complete 3.82 SC 8.0 fl oz at R1 fb Headline AMP 1.68 SC 10.0 fl oz 3 WAT	8.3 cde	1.5 f	0.6 e	20.1	193.6
Headline AMP 1.68 SC 10.0 fl oz at R1 fb Veltyma 3.34 S 7.0 fl oz 3 WAT	11.8 bc	3.3 c-f	1.3 b-e	18.8	198.3
Headline AMP 1.68 SC 10.0 fl oz at R1 fb Aproach Prima 2.34 SC 6.8 fl oz 3 WAT	9.5 b-e	3.9 b-f	1.1 cde	17.9	204.9
Headline AMP 1.68 SC 10.0 fl oz at R1 fb Miravis Neo 2.5 SE 13.7 fl oz 3 WAT	8.0 cde	2.1 ef	0.9 cde	19.0	197.8
Headline AMP 1.68 SC 10.0 fl oz at R1 fb Delaro Complete 3.82 SC 8.0 fl oz 3 WAT	13.2 b	2.9 def	1.2 cde	18.4	201.6
Headline AMP 1.68 SC 10.0 fl oz at R1 fb Headline AMP 1.68 SC 10.0 fl oz 3 WAT	10.5 bcd	4.3 b-e	1.8 b-e	18.4	202.7
P-value[w]	*0.0001*	*0.0001*	*0.0001*	*0.2371*	*0.1684*

[z] Fungicides were applied on 7 Aug at blister (R1) and on 29 Aug, 3 weeks after treatment (3 WAT) at milk (R3) growth stages. All treatments applied contained a non-ionic surfactant (Preference) at a rate of 0.25% v/v. fb= followed by.
[y] Tar spot stromata severity visually assessed percentage (0-100%) of leaf area on five plants in each plot on 16 Sep at dent (R5) growth stage at the ear leaf (EL) and ear leaf ±2 (EL±2).
[x] Yields were adjusted to 15.5% moisture and harvested on 21 Oct.
[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

CORN (*Zea mays* 'W2585VT2P' and 'P0589AMXT')
Tar spot; *Phyllachora maydis*

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Evaluation of hybrid and fungicide timing for tar spot in corn in northwestern Indiana, 2024 (COR24-03.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for grain corn production in Indiana were followed. Corn hybrids 'W2585VT2P' and 'P0589AMXT' were planted in 30-inch row spacing at a rate of 2 seeds/ft on 22 May. All fungicide applications were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Delaro Complete fungicide was applied on 12 Jul, 31 Jul, 16 Aug, and 4 Sep at the 10-leaf (V10), tassel/silk (VT/R1), blister (R2), and dough (R4) growth stages, respectively. A weather-based prediction model, Tarspotter was used and applications were made on 22 Aug and 4 Sep at the R2 + 6 days and R4 growth stages, respectively. Disease ratings were assessed on 26 Aug, 13 Sep, and 25 Sep, at milk (R3), dent (R5), and maturity (R6) growth stages, respectively. Tar spot was rated by visually assessing the percentage of stromata (0-100%) per leaf on five plants in each plot at the ear leaf. Values for each plot were averaged before analysis. The two center rows of each plot were harvested on 18 Oct and yields were adjusted to 15.5% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were favorable for tar spot. Tar spot was first detected in the field on the lower canopy on 15 Jul. Tar spot was the most prominent disease in the trial, with low levels of northern corn leaf blight present. There was a significant interaction between hybrid and fungicide for disease, but data for main effects of hybrid and treatment are presented for brevity (Table 19). The tar spot susceptible hybrid (W2585VT2P) had significantly more tar spot on 26 Aug, 13 Sep and 25 Sep as comparted to the tar spot resistant hybrid (P0589aMXT). On 26 Sep applications of Delaro Compete at V10, VT/R1, and Tarspotter significantly reduced tar spot stromata severity compared to the nontreated control. On 13 Sep and 25 Sep, all timings of Delaro Complete significantly reduced tar spot over nontreated control. By 25 Sep, applications of Delaro Complete at VT/R1 provided had the lowest level of tar spot, followed by applications at R2 and applications made by Tarspotter app as compared to V10 and R4 timings. No significant differences between treatments and nontreated control were observed for grain moisture and test weight. No significant differences between hybrids for grain yield, but fungicide applications at VT/R1, V10, and R2 significantly increased yield over the nontreated control.

Table 19. Effect of fungicide on tar spot severity and yield of corn.

Treatment, rate/A, and timing[z]	Tar spot % [y] 26 Aug	Tar spot % [y] 13 Sep	Tar spot % [y] 25 Sep	Harvest Moisture %	Test weight lb/bu	Yield[x] Bu/A
W2583VT2P	0.49 a	6.0 a	14.7 a	17.2	55.0 b	219.5
P0589AMXT	0.22 b	1.7 b	9.2 b	17.7	55.7 a	216.2
Nontreated control	0.52 a	8.5 a	21.4 a	17.0	55.4	209.3 c
Delaro Complete 3.82 SC 8.0 fl oz at V10	0.22 c	3.6 b	14.9 b	17.1	55.7	221.8 ab
Delaro Complete 3.82 SC 8.0 fl oz at VT/R1	0.17 c	1.1 c	5.8 e	17.7	55.4	225.5 a
Delaro Complete 3.82 SC 8.0 fl oz at R2	0.41 ab	3.3 bc	9.3 d	17.2	55.3	219.2 ab
Delaro Complete 3.82 SC 8.0 fl oz at R4	0.44 ab	4.1 b	12.0 c	17.5	55.4	214.5 bc
Delaro Complete 3.82 SC 8.0 fl oz at Tarspotter	0.38 b	2.6 bc	8.4 d	18.1	54.9	216.7 abc
P-value hybrid[w]	0.0001	<.0001	<.0001	0.2889	0.0074	0.2410
P-value treatment	0.0001	<.0001	<.0001	0.5811	0.6500	0.0294
P-value hybrid by treatment	0.2518	0.0044	0.5842	0.8969	0.2656	0.5464

[z] Fungicide treatments were applied on 12 Jul, 31 Jul, 16 Aug, and 4 Sep at the V10 (10-leaf), tassel/silk (VT/R1), blister (R2), and dough (R4) growth stages, respectively. Tarspotter applications were made on 22 Aug and 4 Sep at R2 + 6 days fb R4 growth stage.

[y] Tar spot stroma visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf (EL).

[x] Yields were adjusted to 15.5% moisture and harvested on 18 Oct.

[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (*Zea mays* 'W2585SSR' and 'P0589AMXT ')
Tar spot; *Phyllachora maydis*
Gray leaf spot*; Cercospora zeae-maydis*
Northern corn leaf blight; *Exserohilum turcicum*

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Evaluation tillage, hybrid, and fungicide for foliar diseases in corn in northwestern Indiana, 2024 (COR24-05.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a split-plot with six replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crops were corn in the no-till block and soybean in the tilled block. Standard practices for grain corn production in Indiana were followed. The tillage blocks (no-till and full-tillage) was main effect. Two corn hybrids and fungicide application (yes/no) were factorial arrangement in the subplots. Corn hybrids 'W2585VT2PRIB' (susceptible) and 'P0589AMXT' (moderately resistant) were planted in 30-inch row spacing at a rate of 2 seeds/ft on 22 May. A fungicide (Veltyma at 7.0 fl oz/A) was applied on 7 Aug at silk (R1) growth stage. The fungicide was applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Tar spot was rated by visually assessing the percentage of stroma per leaf on ten plants in each plot at the ear leaf on 26 Sep at dent/maturity (R5/R6) growth stage. Gray leaf spot (GLS) and northern corn leaf blight (NCLB) were rated by visually assessing the percentage severity on ear leaf on ten plants on 13 Sep at dough/dent (R4/R5) growth stage. Values for each plot were averaged before analysis. The two center rows of each plot were harvested on 22 Oct and yields were adjusted to 15.5% moisture All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were favorable for foliar diseases. Tar spot, gray leaf spot (GLS), and northern corn leaf blight (NCLB) were present in the plots. Tar spot was the most prominent disease in the trial and reached moderate severity. There was a significant interaction between hybrid and Veltyma application for tar spot severity, therefore data presented for that interaction (Table 20). No significant difference was detected between no-tillage and tillage for tar spot severity. Gray leaf spot (GLS) and NCLB were significantly higher in the tillage verses no-till plots. Harvest moisture was reduced under tillage versus no-tillage, while test weight and grain yield were highest in the tillage versus no-tillage treatments. Tar spot severity was highest in the susceptible hybrid with no fungicide application. Veltyma significantly reduced tar spot severity compared to nontreated in both hybrids. There were no significant differences between hybrid and fungicide programs for GLS and NCLB severity, harvest moisture, test weight, and yield of corn.

Table 20. Effect of tillage, hybrid, and fungicide on foliar disease and yield of corn.

Tillage, variety, treatment, and rate/A[z]	Tar spot % stromata[y]	GLS % severity[x]	NCLB % severity[x]	Moisture %	Test weight lb/bu	Yield[w] bu/A
No-tillage (high residue)	8.2	0.1 b	0.0 b	18.4 a	55.9 b	189.5 b
Yes-tillage (low residue)	9.5	0.4 a	3.3 a	15.5 b	57.9 a	211.3 a
Susceptible; Nontreated control	24.9 a	0.4	3.0	17.1	56.0	189.7
Susceptible; Veltyma 3.34 SC 7.0 fl oz	2.4 c	0.1	1.7	16.8	56.8	209.0
Moderately resistant; Nontreated control	6.9 b	0.4	1.7	16.5	57.3	194.5
Moderately resistant; Veltyma 3.34 SC 7.0 fl oz	1.1 c	0.1	0.4	17.6	57.5	208.5
P-value tillage[v]	*0.2642*	*0.0094*	*0.0001*	*0.0001*	*0.0001*	*0.0001*
P-value hybrid	*0.0001*	*0.9481*	*0.0075*	*0.8255*	*0.0019*	*0.5363*
P-value fungicide	*0.0001*	*0.0108*	*0.0097*	*0.4080*	*0.1030*	*0.0001*
*P-value tillage*hybrid*	*0.2140*	*0.3063*	*0.0048*	*0.7731*	*0.0373*	*0.5433*
*P-value tillage*fungicide*	*0.0996*	*0.0940*	*0.0150*	*0.3712*	*0.2139*	*0.6046*
*P-value variety*fungicide*	*0.0001*	*0.7816*	*0.9993*	*0.1552*	*0.3017*	*0.4487*
*P-value tillage*hybrid*fungicide*	*0.4668*	*0.1775*	*0.8626*	*0.8520*	*0.3143*	*0.4106*

[z] Veltyma application was applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Veltyma was applied on 7 Aug at silk growth stage (R1). [y] Tar spot stroma visually assessed percentage (0-100%) of ear leaf on ten plants in each plot on 26 Sep at dent/maturity (R5/R6) growth stage. [x] GLS and NCLB severity visually assessed as percentage (0-100%) of leaf area on ten plants in each plot on 13 Sep at dough/dent (R4/R5) growth stage. GLS = gray leaf spot; NCLB = northern corn leaf blight. [w] Yields were adjusted to 15.5% moisture and harvested on 22 Oct. [v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (*Zea maydis* 'P9608Q' and 'P1108Q')
Tar spot; *Phyllachora maydis*

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Evaluation of planting date, hybrid, and fungicide for tar spot in corn in northwestern Indiana, 2024 (COR24-06.PPAC)

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for non-irrigated grain corn production in Indiana were followed. Corn hybrids 'P9608Q' and 'P1108Q' were planted in 30-inch row spacing at a rate of 2 seeds/ft on 25 Apr and 23 May. Foliar applications were made at the tassel/silk (VT/R1) growth stage on 12 July for 25 Apr planting and 30 July for 23 May planting plots. Foliar fungicide applications were applied using a CO_2 Backpack sprayer at 5 mph for the first planting date (25 Apr) and at 15 gal/A at 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart at 3 mph for the second planting date (23 May). Disease ratings were assessed on 6 Sep, 13 Sep, and 23 Sep at dent (R5) and physiological maturity (R6) growth stages. Tar spot stromata severity visually assessed as a percentage (0-100%) of symptomatic leaf area at ear leaf on five plants per plot and averaged before analysis. The two center rows of each plot were harvested on 21 Oct and yields were adjusted to 15.5% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0,05).

In 2024, weather conditions were favorable for disease. Tar spot was the most prominent disease in the trial and reached moderate severity. On 6 Sep, tar spot severity was significantly reduced by Veltyma compared to the nontreated, while no significant differences were found between plantings and hybrids (Table 21). On 13 Sep, in the 25 Apr planting the Veltyma application was not significantly different from the nontreated control in both hybrids, but in the 23 May planting Veltyma still significantly reduced tar spot severity over the nontreated controls in both hybrids. On 23 Sep, tar spot severity was less than 10% in both hybrids planted on 23 May that included a Veltyma treatment. Hybrid P1108Q planted on 23 May had significantly higher moisture compared to 25 Apr planting and the P9608Q hybrid. P1108Q had significantly higher yield compared to hybrid P9608Q when planted on 25 Apr, no differences between hybrids and treatments were detected for yield when planted on 23 May.

Table 21. Effect of planting date, hybrid and fungicide on tar spot severity, canopy greenness, harvest moisture, and yield of corn.

Planting date, hybrid, and treatment rate/A[z]	Tar spot % severity[y] 6 Sep	Tar spot % severity[y] 13 Sep	Tar spot % severity[y] 23 Sep	Harvest moisture %	Yield[x] bu/A
Planting date A, P9608Q, Nontreated control	9.4 ab	16.8 bcd	22.5 ab	13.9 b	170.0 d
Planting date A, P9608Q, Veltyma 7.0 fl oz	3.9 c	12.3 d	16.2 c	14.6 b	188.1 cd
Planting date A, P1099Q, Nontreated control	8.4 b	21.0 abc	18.6 bc	14.5 b	224.6 ab
Planting date A, P1099Q, Veltyma 7.0 fl oz	4.4 c	16.0 cd	21.9 ab	14.8 b	235.7 a
Planting date B, P9608Q, Nontreated control	12.9 a	25.5 a	24.4 a	14.7 b	202.4 bc
Planting date B, P9608Q, Veltyma 7.0 fl oz	4.0 c	5.5 e	8.5 d	15.5 b	208.6 bc
Planting date B, P1099Q, Nontreated control	10.1 ab	21.8 ab	23.8 ab	18.2 a	203.4 bc
Planting date B, P1099Q, Veltyma 7.0 fl oz	2.2 c	4.1 e	7.0 d	18.1 a	218.4 ab
P-value[w]	*0.0001*	*0.0001*	*0.0001*	*0.0003*	*0.0015*

[z] Foliar applications were made at the tassel/silk (VT/R1) growth stage on 12 July for 25 Apr planting, and 30 July for 23 May planting.

[y] Tar spot stromata visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf (EL), on 6 Sep, 13 Sep, and 23 Sep.

[x] Yields were adjusted to 15.5% moisture and harvested on 21 Oct.

[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

CORN (Zea mays 'W2584 VT2P RIB')
Tar spot; *Phyllachora maydis*

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Evaluation of fungicides for tar spot in corn in northwestern Indiana, 2024 (CORN 24-07.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for irrigated grain corn production in Indiana were followed. Corn hybrid 'W2584 VT2P RIB' was planted in 30-inch row spacing at a rate of 34,000 seed/A on 23 May. The field was overhead irrigated weekly at 1 in. unless weekly rainfall was 1 in. or higher to encourage disease. All products were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Treatments were applied on 7 Aug at silk (R1) growth stage. Disease ratings were assessed on 4 Sep at dough/early dent (R4/R5) and 13 Sep at dent (R5.30) growth stages. Tar spot stromata severity visually assessed as a percentage (0-100%) of symptomatic leaf area at ear leaf on five plants per plot and averaged before analysis. Values for the five leaves were averaged before analysis. The two center rows of each plot were harvested on 23 Oct and yields were adjusted to 15.5% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for the disease. Tar spot was first detected in the field on 19 Jul. All treatments significantly reduced tar spot over nontreated control 4 Sep and 13 Sep (Table 22). No significant differences were detected for canopy greenness, harvest moisture, test weight, and yield of corn.

Table 22. Effect of fungicide on tar spot severity, canopy greenness, and yield of corn.

Treatment and rate/A[z]	Tar spot % stromata[y] 4 Sep	Tar spot % stromata[y] 13 Sep	Canopy green[x] %	Harvest moisture %	Test weight lb/bu	Yield[w] bu/A
Nontreated control	1.4 a	14.1 a	63.8	18.0	58.0	175.3
Maxentis SC 4.8 fl oz	0.4 de	3.3 b	75.0	17.5	57.7	188.2
Maxentis SC 9.6 fl oz	0.2 e	3.1 b	71.3	18.7	58.1	191.2
Stratego YLD 5.0 fl oz	0.7 cd	3.6 b	72.5	19.7	57.5	183.9
Veltyma 3.34 SC 10.0 fl oz	1.0 b	5.0 b	75.0	17.5	58.6	199.3
Headline AMP 14.4 fl oz	0.9 bc	4.2 b	73.8	19.1	57.5	183.0
P-value[v]	*0.0001*	*0.0001*	*0.0335*	*0.5086*	*0.6821*	*0.4027*

[z] Fungicides were applied on 7 Aug at silk (R1) growth stage.
[y] Tar spot stromata visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 4 Sep and 13 Sept at dough/early dent (R4/R5) and dent (R5.30) growth stage, respectively.
[x] Canopy greenness as %, visually rated per plot was assessed on 13 Sep at dent (R5) growth stage.
[w] Yields were adjusted to 15.5% moisture and harvest on 23 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (Zea mays 'W2584 VT2P RIB')
Tar spot; *Phyllachora maydis*

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Evaluation of fungicides for tar spot in corn in northwestern Indiana, 2024 (CORN 24-14.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for non-irrigated grain corn production in Indiana were followed. Corn hybrid 'W2584 VT2P RIB' was planted in 30-inch row spacing at a rate of 2 seeds/ft on 23 May. The 2x2 treatments were applied at plant in 10 gal/A. Foliar fungicides were applied at 15 gal/A and 40 psi using a CO_2 backpack at V10 and Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart at VT/R1. Fungicides were applied on 12 Jul at V10 and 31 Jul at tassel/silk (VT/R1) growth stages. Disease ratings were assessed on 4 Sep at dough (R4) and 13 Sep at dent (R5) growth stages. Tar spot stromata severity visually assessed as a percentage (0-100%) of symptomatic leaf area at ear leaf on five plants per plot and averaged before analysis. Values for the five leaves were averaged before analysis. The two center rows of each plot were harvested on 21 Oct and yields were adjusted to 15.5% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for the disease. Tar spot was the most prominent disease in the trial. Tar spot was first detected in plots on 2 Aug. No significant differences between treatments were detected for tar spot severity on 4 Sep (Table 23). All fungicide programs reduced tar spot significantly compared to nontreated control on 13 Sep. No significant differences were detected for canopy greenness, harvest moisture, test wight, and yield of corn.

Table 23. Effect of treatment on tar spot severity and yield of corn.

Treatment, rate/A, and timing[z]	Tar spot % severity[y] 4 Sep	Tar spot % severity[y] 13 Sep	Harvest Moisture %	Test weight lb/bu	Yield[x] Bu/A
Nontreated control	0.10	9.1 a	15.7	57.4	209.8
Veltyma 3.34 SC 7.0 fl oz + NIS at 0.25% v/v at VT/R1	0.06	1.1 f	16.1	57.6	209.5
Delaro Complete 8.0 fl oz + NIS at 0.25% v/v at VT/R1	0.06	1.2 ef	17.0	57.0	207.4
Topguard 8.0 fl oz at V10	0.08	5.5 bc	17.0	56.8	210.7
Adastrio 8.0 fl oz at V10	0.07	5.6 b	16.6	57.6	203.5
Xyway LFR 9.5 fl oz 2x2 at plant fb Adastrio 7.0 fl oz + NIS at 0.25% v/v at VT/R1	0.05	2.4 def	18.0	56.7	202.0
Xyway LFR 15.2 fl oz 2x2 at plant fb Veltyma 3,34 SC 7.0 fl oz + NIS at 0.25% v/v at VT/R1	0.07	0.6 f	16.3	57.3	217.8
Xyway LFR 15.2 fl oz 2x2 at plant	0.13	6.4 b	16.8	57.4	201.7
Veltyma 3.34 SC 7.0 fl oz + OR-099EPA 0.4% v/v at VT/R1	0.04	0.8 f	16.5	57.5	214.3
Delaro Complete 8.0 fl oz + OR-099EPA 0.4% v/v at VT/R1	0.10	1.8 def	16.6	57.4	212.6
Cortina Xtra 8.0 fl oz at VT/R1	0.04	1.7 def	17.0	57.0	211.5
Cortina Xtra 8.0 fl oz + Nutex EDA 8.0 fl oz at VT/R1	0.04	1.7 def	16.5	57.3	207.8
Cortina Xtra 12.0 fl oz at VT/R1	0.05	3.1 de	18.3	56.5	211.4
SA-0050010 5.7 fl oz at VT/R1	0.05	3.4 d	16.5	57.3	210.3
SA-0050010 5.7 fl oz + Nutex EDA 8.0 fl oz at VT/R1	0.09	3.5 cd	17.2	56.7	211.2
Maxentis SC 9.6 fl oz at VT/R1	0.05	1.9 def	16.7	57.4	213.0
P-value[w]	*0.1036*	*0.0001*	*0.3832*	*0.6380*	*0.7033*

[z] The 2x2 treatments were applied at plant in 10 gal/A. Foliar fungicides were applied on 12 Jul at V10 and 31 Jul at tassel/silk (VT/R1) growth stages in 15 gal/A.

[y] Tar spot stromata visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 4 Sep at dough (R4) and 13 Sep at dent (R5.40) growth stages.

[x] Yields were adjusted to 15.5% moisture and harvest on 21 Oct.

[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (Zea mays 'W2584 VT2P RIB')
Tar spot; *Phyllachora maydis*

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Industry sponsored fungicide evaluation for tar spot in corn in northwestern Indiana, 2024 (CORN 24-18.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for non-irrigated grain corn production in Indiana were followed. Corn hybrid 'W2584 VT2P RIB' was planted in 30-inch row spacing at a rate of 34,000 seed/A on 23 May. The field was overhead irrigated weekly at 1 in. unless weekly rainfall was 1 in. or higher to encourage disease. All fungicides were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicides were applied on 7 Aug at silk (R1) and 20 Aug milk (R3) growth stages and included NIS (Masterlock 6.4 fl oz/A). Disease ratings were assessed on 5 Sep at beginning dent (R5) and 12 Sep at dent (R5.40) growth stages. Tar spot stromata severity visually assessed as a percentage (0-100%) of symptomatic leaf area at ear leaf on five plants per plot and averaged before analysis. Values for the five leaves were averaged before analysis. The two center rows of each plot were harvested on 22 Oct and yields were adjusted to 15.5% moisture. All disease and yield data were analyzed using a mixed model analysis of variance, and means were separated using Fisher's least significant difference (α=0.05).

In 2024, weather conditions were moderately favorable for the diseases. Tar spot was first detected in plots on 19 Jul. All fungicide treatments significantly reduced tar spot as compared to nontreated control on 5 Sep and 12 Sep (Table 24). On 5 Sep, tar spot has the lowest severity with Miravis Neo at R1 fb Miravis Neo at R3, but this was not significantly different from Trivapro or Miravis Neo applied at R1. On 12 Sep the Miravis Neo at R1 fb Miravis Neo at R3 has the lowest level of tar spot as compared to the other programs. No significant differences were detected for canopy greenness, harvest moisture, and test weight. All fungicides program increased grain yield over the nontreated control.

Table 24. Effect of fungicide treatment on tar spot severity, canopy greenness, and yield of corn.

Treatment, rate/A, and timing[z]	Tar spot % stromata[y] 5 Sep	Tar spot % stromata[y] 12 Sep	Canopy green[x] %	Harvest Moisture %	Test weight lb/bu	Yield[w] bu/A
Nontreated control	7.4 a	26.0 a	76.3	15.3	57.8	178.7 c
Trivapro 13.7 fl oz at R1	2.0 de	9.1 cd	78.8	18.1	56.1	190.8 b
Miravis Neo 13.7 fl oz at R1	2.2 de	9.2 cd	75.0	17.6	57.5	193.4 ab
Veltyma 7.0 fl oz at R1	2.8 cd	9.8 cd	78.8	16.8	57.8	195.5 ab
Delaro Complete 8.0 fl oz at R1	2.7 d	6.8 de	76.3	16.5	58.2	200.5 a
Adastrio 7.0 fl oz at R1	2.5 d	9.5 cd	73.8	18.6	56.9	189.1 b
Miravis Neo 13.7 fl oz at R3	3.9 bc	15.4 b	72.5	17.5	57.2	195.3 ab
Miravis Neo 13. 7 fl oz at R1 fb Miravis Neo 13.7 fl oz at R3	1.3 e	4.5 e	78.8	17.2	58.2	198.1 ab
P-value[v]	*0.0001*	*0.0001*	*0.8427*	*0.0698*	*0.1975*	*0.0056*

[z] Fungicides were applied on 30 Jul at silk (R1) growth stage and included NIS (Masterlock 6.4 fl oz).
[y] Tar spot stromata visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 5 Sep at beginning dent (R5) and 12 Sep at dent (R5.40) growth stages.
[x] Canopy greenness as %, visually rated per plot was assessed on 12 Sep at dent (R5) growth stage.
[w] Yields were adjusted to 15.5% moisture and harvest on 22 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's protected LSD test (α=0.05).

CORN (Zea mays 'W2584 VT2P RIB')
Tar spot; *Phyllachora maydis*

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Evaluation of fungicides for tar spot in corn in northwestern Indiana, 2024 (CORN 24-22.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for irrigated grain corn production in Indiana were followed. Corn hybrid 'W2584 VT2P RIB' was planted in 30-inch row spacing at a rate of 34,000 seed/A on 23 May. The field was overhead irrigated weekly at 1 in. unless weekly rainfall was 1 in. or higher to encourage disease. All fungicides were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicides were applied on 24 Jun at V5 and 7 Aug at silk (R1) growth stages. Disease ratings were assessed on 4 Sep at dough (R4) and 13 Sep at dent (R5.30) growth stages. Tar spot stromata severity visually assessed as a percentage (0-100%) of symptomatic leaf area at ear leaf on five plants per plot and averaged before analysis. Values for the five leaves were averaged before analysis. The two center rows of each plot were harvested on 23 Oct and yields were adjusted to 15.5% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for the diseases. Tar spot was the most prominent disease and was first detected in the field on 19 Jul. All fungicide treatments significantly reduced tar spot as compared to nontreated control on 4 Sep and 13 Sep, except Affiance applied at V5 on 13 Sep (Table 25). On 5 Sep and 13 Sep, tar spot has the lowest severity with Miravis Neo applied at R1, but this was not significantly different from Delaro Complete or Affiance applied at R1. All fungicide programs increase canopy greenness on 13 Sep over nontreated control. No significant differences were detected for moisture, and test weight of corn. All fungicides program increased grain yield over nontreated control, except Affiance at V5. Affiance at V5 fb Veltyma at R1 and Veltyma at R1 had the highest yield, but were not significantly different from Delaro Complete at R1 and Miravis Neo at R1.

Table 25. Effect of treatment on tar spot severity, canopy greenness, and yield of corn.

Treatment, rate/A, and timing[z]	Tar spot % stromata[y] 4 Sep	Tar spot % stromata[y] 13 Sep	Canopy green[x] %	Harvest moisture %	Test weight lb/bu	Yield[w] Bu/A
Nontreated control	1.2 a	13.6 a	63.8 c	17.2	57.7	176.1 c
Affiance 10.0 fl oz at V5	0.8 b	14.5 a	70.0 b	18.2	57.4	173.0 c
Affiance 10.0 fl oz at R1	0.3 cd	3.5 bc	77.5 a	19.4	57.0	180.4 bc
Affiance 10.0 fl oz at V5 fb Veltyma 7.8 fl oz at R1	0.6 b	5.0 b	77.5 a	19.2	57.5	199.5 a
Veltyma 7.8 fl oz at R1	0.6 b	5.3 b	78.8 a	20.4	56.7	199.5 a
Delaro Complete 7.5 fl oz at R1	0.3 c	2.6 bc	78.8 a	19.9	57.0	191.8 ab
Miravis Neo 13.6 fl oz at R1	0.1 d	1.6 c	78.8 a	17.2	58.1	193.8 ab
P-value[v]	*0.0001*	*0.0001*	*0.0001*	*0.1987*	*0.7943*	*0.0017*

[z] Fungicides were applied on 24 Jun at V5 and 7 Aug at silk (R1) growth stages.
[y] Tar spot stromata visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 4 Sep at dough (R4) and 13 Sep at dent (R5.30) growth stages.
[x] Canopy greenness as %, visually rated per plot was assessed on 13 Sep.
[w] Yields were adjusted to 15.5% moisture and harvest on 23 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (Zea mays 'W2584 VT2P RIB')
Tar spot; *Phyllachora maydis*

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Evaluation of fungicides for tar spot in corn in northwestern Indiana, 2024 (CORN 24-28.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for non-irrigated grain corn production in Indiana were followed. Corn hybrid 'W2584 VT2P RIB' was planted in 30-inch row spacing at a rate of 34,000 seed/A on 23 May. All fungicide were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicides were applied on 30 Jul at silk (R1) growth stage. Disease ratings were assessed on 30 Aug at milk (R3) and 12 Sep at dent (R5.40) growth stages. Tar spot stromata severity visually assessed as a percentage (0-100%) of symptomatic leaf area at ear leaf on five plants per plot and averaged before analysis. Values for the five leaves were averaged before analysis. The two center rows of each plot were harvested on 21 Oct and yields were adjusted to 15.5% moisture. All disease and yield data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for the diseases. Tar spot was the most prominent disease and was first detected in plots on 5 Aug. All fungicide treatments significantly reduced tar spot as compared to nontreated control on 30 Aug and 12 Sep (Table 26). No significant differences were detected for canopy greenness, harvest moisture, test wight, and yield of corn.

Table 26. Effect of treatment on tar spot severity, canopy greenness, and yield of corn.

Treatment and rate/A[z]	Tar spot % stromata[y] 30 Aug	Tar spot % stromata[y] 12 Sep	Canopy green[x] %	Harvest Moisture %	Test weight lb/bu	Yield[w] Bu/A
Nontreated control	0.6 a	10.1 a	70.0	16.2	56.9	203.2
Veltyma 7.0 fl oz	0.2 b	1.6 b	75.0	17.7	57.4	215.1
Miravis Neo 13.7 fl oz	0.1 b	3.3 b	78.8	18.6	64.6	205.7
Delaro Complete 8.0 fl oz	0.2 b	3.4 b	73.8	16.2	56.8	213.6
Adastrio 8.0 fl oz	0.1 b	3.3 b	77.5	16.9	55.8	209.2
P-value[v]	*0.0001*	*0.0001*	*0.0669*	*0.1762*	*0.5679*	*0.6637*

[z] Fungicides were applied on 30 Jul at silk (R1) growth stage and included NIS (Preference) 0.25% v/v.

[y] Tar spot stromata visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 30 Aug at milk (R3) and 12 Sep at dent (R5.40) growth stages.

[x] Canopy greenness as percentage (0-100%), visually rated on 12 Sep.

[w] Yields were adjusted to 15.5% moisture and harvested on 21 Oct.

[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (Zea mays 'W2584 VT2P RIB')
Tar spot; *Phyllachora maydis*

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Evaluation of fungicide for tar spot in corn in northwestern Indiana, 2024 (CORN 24-29.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for non-irrigated grain corn production in Indiana were followed. Corn hybrid 'W2584 VT2P RIB' was planted in 30-inch row spacing at a rate of 34,000 seed/A on 23 May. All fungicide were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicides were applied on 25 Jul at V14, 31 Jul at silk (R1), and 20 Aug at milk (R3) growth stages. Disease ratings were assessed on 9 Sep at dent (R5), and 25 Sep at maturity (R6) growth stages. Tar spot stromata severity visually assessed as a percentage (0-100%) of symptomatic leaf area at ear leaf on five plants per plot and averaged before analysis. Values for the five leaves were averaged before analysis. The two center rows of each plot were harvested on 18 Oct and yields were adjusted to 15.5% moisture. All disease and yield data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for the diseases. Tar spot was the most prominent disease and was first detected in plots on 2 Aug. All fungicide programs reduced tar spot on compared to the nontreated control on 9 Sep and 25 Sep (Table 27). Fungicide programs of Delaro Complete 12.0 fl oz at V14; Delaro 325 SC 10.0 fl oz at R1; Delaro Complete 8.0 fl oz at R1 fb Delaro Complete 8.0 fl oz at R3; Delaro Complete 8.0 fl oz at R1 fb Prosaro Pro 10.3 fl oz at R3; Delaro Complete 8.0 fl oz at R1 fb Absolute Maxx 6.0 fl oz at R3; and Delaro Complete 8.0 fl oz at R1 fb Delaro 8.0 fl oz at R3 resulted in the lowest tar spot on 25 Sep. A number of the programs increased harvest moisture over nontreated control (range 17.5 to 21.3%). No significant differences were detected for canopy greenness, test wight, and yield of corn.

Table 27. Effect of treatment on tar spot severity, canopy greenness, and yield of corn.

Treatment, rate/A and timing[z]	Tar spot %[y] 9 Sep	Tar spot %[y] 25 Sep	Canopy green[x] %	Harvest moisture %	Test weight lb/bu	Yield[w] bu/A
Nontreated control	1.6 a	22.5 a	51.3	17.5 d	56.2	211.0
Delaro Complete 3.82 SC 8.0 fl oz at V14	0.6 def	6.9 d	51.3	20.1 abc	54.6	209.9
Delaro Complete 3.82 SC 12.0 fl oz at V14	0.4 f	3.0 f	51.3	21.3 a	54.7	207.9
Delaro Complete 3.82 SC 8.0 fl oz at R1	0.7 cd	6.7 de	55.0	19.0 bcd	55.5	216.4
Delaro Complete 3.82 SC 10.0 fl oz at R1	0.6 cde	4.8 def	56.3	19.7 a-d	54.8	218.3
Delaro Complete 3.82 SC 12.0 fl oz at R1	0.5 def	4.1 def	53.8	19.1 bcd	55.2	213.8
Delaro 325 SC 10.0 fl oz at R1	0.5 def	3.3 f	62.5	19.2 a-d	55.9	216.8
Veltyma 7.0 fl oz at R1	0.6 def	3.7 ef	55.0	17.6 d	56.4	217.0
Miravis Neo 13.7 fl oz at R1	0.9 bc	15.4 b	52.5	20.1 abc	55.5	211.4
Trivapro 13.7 fl oz at R1	0.9 bc	11.6 c	66.3	20.0 cd	61.6	214.7
Delaro Complete 3.82 SC 8.0 fl oz at R3	1.1 b	15.3 b	56.3	18.0 ab	56.0	206.7
Delaro Complete 3.82 SC 8.0 fl oz at R1 fb Delaro Complete 3.82 SC 8.0 fl oz at R3	0.4 ef	2.7 f	61.3	20.6 ab	55.3	206.7
Delaro Complete 3.82 SC 8.0 fl oz at R1 fb Prosaro Pro 10.3 fl oz at R3	0.5 def	2.7 f	50.0	18.3 cd	56.3	212.0
Delaro Complete 3.82 SC 8.0 fl oz at R1 fb Absolute Maxx 6.0 fl oz at R3	0.4 ef	2.2 f	57.5	19.0 bcd	55.8	221.2
Delaro Complete 3.82 SC 8.0 fl oz at R1 fb Delaro 325 SC 8.0 fl oz at R3	0.4 ef	2.1 f	50.0	17.6 d	56.3	218.6
P-value[v]	*0.0001*	*0.0001*	*0.3723*	*0.0137*	*0.3980*	*0.7459*

[z] Fungicides were applied on 25 Jul at V14, 31 Jul at silk (R1) and 20 Aug at milk (R3) growth stages and included NIS (Preference) at 0.25% v/v at R1 and R3. [y] Tar spot stromata visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 9 Sep at dent (R5), and 25 Sep at maturity (R6) growth stages. [x] Canopy greenness as %, visually rated per plot was assessed on 16 Sep at dent (R5) growth stage. [w] Yields were adjusted to 15.5% moisture and harvest on 18 Oct. [v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

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Evaluation of fungicide for tar spot in corn in northwestern Indiana, 2024 (CORN 24-31.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for irrigated grain corn production in Indiana were followed. Corn hybrid 'W2584 VT2P RIB' was planted in 30-inch row spacing at a rate of 34,000 seed/A on 23 May. The field was overhead irrigated weekly at 1 in. unless weekly rainfall was 1 in. or higher to encourage disease. All products were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Treatments were applied on 7 Aug at silk (R1) growth stage. Disease ratings were assessed on 5 Sep at dent (R5.10) and 13 Sep at dent (R5.30) growth stages. Tar spot stromata severity visually assessed as a percentage (0-100%) of symptomatic leaf area at ear leaf on five plants per plot and averaged before analysis. Values for the five leaves were averaged before analysis. The two center rows of each plot were harvested on 22 Oct and yields were adjusted to 15.5% moisture. All disease and yield data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for the diseases. Tar spot was the most prominent disease in the trial and first detected in the field on 19 Jul. No significant differences for all treatments were detected for tar spot on 5 Sep and 13 Sep at EL (Table 28). The lowest severity of tar spot was with treatments of Veltyma and Veltyma + WC250 4.0 fl oz, but were not significantly different from Veltyma + WC460 3.0 fl oz, Veltyma + WC450 3.0 fl oz, and Veltyma + WC112 0.25 % V/V. Veltyma + WC460 3.0 fl oz and Veltyma + WC450 3.0 fl oz significantly increased canopy greenness over nontreated control on 16 Sep. No significant differences were detected for harvest moisture, and test weight of corn. All fungicides program increased grain yield over nontreated control, except WC634 1.0 GAL/A + WC450 3.0 fl oz and WC843 1.0 QT/A + WC450 3.0 fl oz. Veltyma + WC250 4.0 fl oz treatment had the highest yield of corn.

Table 28. Effect of treatment on tar spot severity, canopy greenness, and yield of corn.

Treatment and rate/A[z]	Tar spot % stromata[y] 5 Sep	Tar spot % stromata[y] 13 Sep	Canopy green[x] %	Harvest Moisture %	Test weight lb/bu	Yield[w] Bu/A
Nontreated control	6.7	7.9	68.8 c	16.7	57.7	176.0 c
Veltyma 7.0 fl oz	5.5	6.6	70.0 bc	18.8	57.3	207.2 b
Veltyma 7.0 fl oz + WC250 4.0 fl oz	6.2	6.3	70.0 bc	19.2	56.7	217.6 a
Veltyma 7.0 fl oz + WC460 3.0 fl oz	5.5	4.7	72.5 ab	19.1	56.5	202.4 b
Veltyma 7.0 fl oz + WC450 3.0 fl oz	6.4	7.8	73.8 a	18.5	57.3	200.1 b
Veltyma 7.0 fl oz + WC112 0.25 % V/V	5.0	5.8	71.3 abc	18.9	57.1	197.1 b
WC634 1.0 GAL/A + WC450 3.0 fl oz	5.5	6.4	70.0 bc	17.6	56.9	173.5 c
WC843 1.0 QT/A + WC450 3.0 fl oz	4.7	5.7	70.0 bc	17.1	57.3	181.6 c
P-value[v]	*0.8485*	*0.9910*	*0.0282*	*0.0691*	*0.5808*	*0.0001*

[z] Fungicides were applied on 7 Aug at silk (R1) growth stage.
[y] Tar spot stromata visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 5 Sep at dent (R5.10) and 13 Sep at dent (R5.30) growth stages.
[x] Canopy greenness as percent (0-100%), visually rated per plot was assessed on 16 Sep at dent (R5) growth stage.
[w] Yields were adjusted to 15.5% moisture and harvest on 22 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (*Zea mays* 'W2584 VT2P RIB')
Tar spot; *Phyllachora maydis*

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Evaluating biological fungicides for tar spot in corn in northwestern Indiana, 2024 (CORN 24-36.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was soybean. Standard practices for non-irrigated grain corn production in Indiana were followed. Corn hybrid 'W2584 VT2P RIB' was planted in 30-inch row spacing at a rate of 34,000 seed/A on 23 May. Foliar fungicides were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicides were applied on 30 Jul at silk (R1) growth stage. Disease ratings were assessed on 4 Sep and 13 Sep at dough/dent (R4/R5) and dent (R5) growth stages, respectively. Tar spot stromata severity was visually assessed as a percentage (0-100%) of affected leaf area at ear leaf on five plants per plot and averaged before analysis. The two center rows of each plot were harvested on 18 Oct and yields were adjusted to 15.5% moisture. All disease and yield data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for disease. Tar spot was the most prominent disease in the trial and first detected in plots on 15 Jul. On 4 Sep, all the treatments significantly reduced tar spot severity compared to nontreated control (Table 29). On 13 Sep, no significant differences were detected for tar spot severity. There were no significant differences between treatments for moisture, test weight, and yield of corn.

Table 29. Effect of treatment on foliar disease severity and yield of corn.

Treatment and rate/A[z]	Tar spot % stromata[y] 4 Sep	Tar spot % stromata[y] 13 Sep	Harvest moisture %	Test weight lb/bu	Yield[x] bu/A
Nontreated control	0.7 a	11.9	18.3	56.7	205.5
Headline Amp 10.0 fl oz	0.3 b	4.8	17.5	57.1	212.9
Serifel 16.0 oz	0.4 b	8.7	17.8	60.4	210.0
Actinovate 12.0 oz	0.4 b	6.5	17.6	56.8	209.1
Badge X2 1.8 lb	0.3 b	4.4	17.4	56.4	205.2
Oxidate 2.0 1:100 ratio	0.4 b	7.1	18.3	56.4	206.4
P-value[w]	*0.0026*	*0.1806*	*0.7820*	*0.5367*	*0.8149*

[z] Fungicide treatments were applied on 30 Jul at silk (R1) growth stage.

[y] Tar spot stromata visually assessed as the percentage (0-100%) of affected leaf area on five plants in each plot at the ear leaf on 4 Sep and 13 Sep at dough/dent (R4/R5) and dent (R5) growth stages, respectively.

[x] Yields were adjusted to 15.5% moisture and harvest on 18 Oct.

[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (*Zea mays* 'W2584 VT2P RIB')
Tar spot; *Phyllachora maydis*

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Evaluation of fungicide for tar spot in corn in northwestern Indiana, 2024 (CORN 24-37.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was soybean. Standard practices for non-irrigated grain corn production in Indiana were followed. Corn hybrid 'W2584 VT2P RIB' was planted in 30-inch row spacing at a rate of 34,000 seed/A on 23 May. All fungicide were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicides were applied on 30 Jul at silk (R1), 16 Aug at blister (R2), and 20 Aug at milk (R3) growth stages. Disease ratings were assessed on 28 Aug at R3, 9 Sep at dent (R5) and 25 Sep at maturity (R6) growth stages. Tar spot stromata severity visually assessed as a percentage (0-100%) of symptomatic leaf area at ear leaf on five plants per plot and averaged before analysis. Values for the five leaves were averaged before analysis. The two center rows of each plot were harvested on 18 Oct and yields were adjusted to 15.5% moisture. All disease and yield data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for the diseases. Tar spot was the most prominent disease in the trial and first detected in plots on 15 Jul. Treatments that included Miravis Neo significantly reduced tar spot on 28 Aug and 9 Sep over nontreated control (Table 30). Treatments that included Miravis Neo significantly reduced tar spot on 25 Sep as compared to nontreated control. CX-9032 1.0 pt at R1 also significantly reduced tar spot on 25 Sep as compared to nontreated control. No significant differences were detected for harvest moisture, test weight and yield of corn.

Table 30. Effect of treatment on tar spot severity, lodging, and yield of corn.

Treatment, rate/A and timing[z]	**Tar spot % stromata**[y] **28 Aug**	**Tar spot % stromata**[y] **9 Sep**	**Tar spot % stromata**[y] **25 Sep**	**Harvest Moisture %**	**Test weight lb/bu**	**Yield**[x] **bu/A**
Nontreated control	0.7 a	2.3 a	24.5 a	18.0	56.4	215.0
CX-9032 1.0 pt at R1	0.7 a	2.1 ab	20.8 bcd	17.5	56.6	227.5
CX-9032 1.0 qt + Miravis Neo 13.7 fl oz at R1	0.2 b	1.8 bc	20.0 cde	18.0	56.7	260.4
CX-10250 1.0 oz at R1	0.6 a	2.0 ab	21.2 a-d	18.2	56.8	224.9
CX-10250 1.0 oz at R1 and R3	0.6 a	2.1 ab	23.8 ab	18.1	56.7	212.4
CX-10250 1.0 oz at R2	0.6 a	2.0 ab	23.3 abc	17.4	56.6	229.8
CX-10250 1.0 oz + Miravis Neo 13.7 fl oz at R1	0.2 b	1.3 d	16.5 e	18.1	56.9	233.1
Miravis Neo 13.7 fl oz at R1	0.1 b	1.4 cd	18.3 de	18.9	61.9	253.1
P-value[w]	*0.0001*	*0.0006*	*0.0019*	0.2949	*0.4828*	*0.3824*

[z] Fungicides were applied on 30 Jul at silk (R1), 16 Aug at blister (R2), and 20 Aug at milk (R3) growth stages and included NIS (Preference) at 0.25% v/v.

[y] Tar spot stromata severity visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 28 Aug at milk (R3), 9 Sep at dent (R5) and 25 Sep at maturity (R6) growth stages, respectively.

[x] Yields were adjusted to 15.5% moisture and harvest on 18 Oct.

[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (*Zea mays* 'PR111-20SSC' and 'PR108-20SSC')
Tar spot; *Phyllachora maydis*

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Fungicide comparison for tar spot on short sorn in northwestern Indiana, 2024 (COR24-39.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for irrigated grain corn production in Indiana were followed. Corn hybrid 'PR111-20SSC' and 'PR108-20SSC' were planted in 30-inch row spacing at a rate of 2 seeds/ft on 22 May. All fungicide were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicides were applied on 7 Aug at silk (R1) growth stage. Disease ratings were assessed on 4 Sep and 13 Sep at dough/dent (R4/R5) and dent (R5) growth stages, respectively. Tar spot stromata severity and chlorosis/necrosis visually assessed as a percentage (0-100%) of symptomatic leaf area at ear leaf on five plants per plot and averaged before analysis. Values for the five leaves were averaged before analysis. The two center rows of each plot were harvested on 23 Oct and yields were adjusted to 15.5% moisture. All disease and yield data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for the diseases. Tar spot was the most prominent disease in the trial and first detected in plots on 19 July. There was no significant difference between hybrids on tar spot severity on 4 and 13 Sep (Table 31). On 13 Sep, Hybrid PR111-20SSC has significantly reduced tar spot chlorosis and necrosis symptoms than PR108-20SSC. Harvest moisture was significantly higher for PR111-20SSC than PR108-20SSC. There was no significant difference between hybrids for canopy greenness, test weight and yield. The Delaro Complete application significantly reduced tar spot severity over the nontreated control on 4 and 13 Sep, and significantly reduced chlorosis and necrosis compared on 13 Sep. Delaro Complete significantly increased harvest moisture over the nontreated control, there was no significant difference in test weight. Delaro Complete application significantly increased the yield of corn over the nontreated control.

Table 31. Effect of treatment on tar spot severity, canopy greenness, and yield of corn.

Hybrid, treatment and rate/A[z]	Tar spot % stromata[y] 4 Sep	Tar spot % stromata[y] 13 Sep	Tar spot % chlor/nec[x] 13 Sep	Canopy green[w] %	Harvest moisture %	Test weight lb/bu	Yield[v] Bu/A
Hybrid							
PR111-20SSC	0.6	5.6	0.4 b	76.9	21.3 a	54.0	176.1
PR108-20SSC	0.7	5.3	2.3 a	73.1	18.9 b	54.5	171.3
Fungicide							
Nontreated control	1.2 a	9.5 a	2.6 a	70.6	18.7 b	54.5	162.9 b
Delaro Complete 3.82 SC 8.0 fl oz	0.2 b	1.5 b	0.1 b	79.4	21.5 a	54.0	184.5 a
P-value hybrid[u]	*0.4312*	*0.4695*	*0.0009*	*0.4250*	*0.0314*	*0.4458*	*0.4941*
P-value fungicide	*0.0001*	*0.0001*	*0.0001*	*0.0830*	*0.0155*	*0.3816*	*0.0105*
*P-value hybrid*fungicide*	*0.8727*	*0.3917*	*0.0022*	*0.1290*	*0.3812*	*0.1948*	*0.7017*

[z] Delaro complete applied on 7 Aug at silk (R1) growth stage.
[y] Tar spot stromata visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 4 Sep and 13 Sep at dough/dent (R4/R5) and at dent (R5) growth stages, respectively.
[x] Tar spot chlorosis and necrosis visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 13 Sep at dent (R5) growth stage.
[w] Canopy greenness as %, visually rated per plot was assessed on 16 Sep at dent (R5) growth stage.
[v] Yields were adjusted to 15.5% moisture and harvest on 23 Oct.
[u] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

CORN (*Zea mays* 'W2584VT2PRIB')
Tar spot; *Phyllachora maydis*

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Evaluation of dent (R5) fungicide application in corn in northwestern Indiana, 2024 (COR24-40.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block with eight replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crops were soybean. Standard practices for non-irrigated grain corn production in Indiana were followed. Corn hybrid 'W2584VT2PRIB' was planted in 30-inch row spacing at a rate of 34,000 seeds/ft on 23 May. Fungicide application was done at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicide was applied on 12 Sep at Aug at dent (R5) growth stage. Disease ratings were assessed on 25 Sep at maturity (R6) growth stage. Tar spot severity was rated by visually assessing the percentage of stroma per leaf on ten plants in each plot at the ear leaf. Values for each plot were averaged before analysis. Lodging was evaluated on 25 Sep by determining the percentage of lodged stalks when pushed from shoulder height to the 45° from vertical. The two center rows of each plot were harvested on 18 Oct and yields were adjusted to 15.5% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were favorable for disease. Tar spot was the most prominent in the trial and reached moderate severity in the trial. There was no significant difference in treatments at R5 for tar spot severity (Table 32). There was no significant effect on treatments on lodging, harvest moisture, test weight and yield of corn.

Table 32. Effect of fungicide application at dent (R5) for tar spot severity, lodging, and yield of corn.

Treatment, rate/A, and timing[z]	Tar spot[y] %	Lodging[x] %	Harvest moisture %	Test weight lb/bu	Yield[w] bu/A
Nontreated control	23.0	15.0	16.9	57.1	219.1
Veltyma 3.34 SC 7.0 fl oz at R5	23.2	25.0	16.7	57.1	209.5
P-value[v]	*0.8715*	*0.2753*	*0.6551*	*0.9683*	*0.1832*

[z] Veltyma application was made at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicide was applied on 12 Sep at Aug at dent (R5) growth stage and contained a non-ionic surfactant at a rate of 0.25% v/v.

[y] Tar spot stroma visually assessed as the percentage (0-100%) of leaf area on ten plants in each plot at the ear leaf on 25 Sep at R6 (maturity) growth stage.

[x] Lodging determined as percentage of lodged stalks when pushed from shoulder height to the 45° from vertical on 25 Sep.

[w] Yields were adjusted to l5.5% moisture and harvest on 18 Oct.

[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

SOYBEAN (*Glycine max* 'AG26XF1')
Sudden death syndrome; *Fusarium virguliforme*

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Evaluation of seed treatment for sudden death syndrome on soybean in northwesterm Indiana, 2024 (SOY24-04.PPAC).

A trial was established at the Purdue Pinney Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Soybean cultivar 'AG26XF1' was planted in 30-inch row spacing at a rate of 8 seeds/ft on 25 April. *Fusarium virguliforme* inoculum was applied at planting at 1.25 g/ft within the seedbed. Seed treatments were applied on seeds before planting. Standard practices for soybean production in Indiana were followed. In-furrow and 2x2 applications were applied in 10 gal/A at planting on 25 Apr. Xylem Plus was applied at full flowering (R2) growth stage at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Disease ratings were assessed on 30 Aug at beginning maturity (R7) growth stage. SDS in each plot was rated for disease incidence (DI) and disease severity (DS). Disease incidence was percentage of plants with disease symptoms, and disease severity (DS) was rated using a 1-9 scale where 1 refers to low disease pressure and 9 refers to premature death of the plant. SDS Index was then calculated using the equation:DX = (DI X DS)/9. Root rot rating was assessed at R4 (full pod) growth stage on 9 Aug. The two center rows of each plot were harvested on 2 Oct and yields were adjusted to 13% moisture. All disease and yield data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for disease development. Sudden death syndrome (SDS) was present in the trial. All the treatments significantly reduced SDS incidence and index compared to the nontreated control (Table 33). There was no significant effect of treatments on root rot severity and test weight compared to the nontreated control. All the seed treatments significantly increased the yield compared to the nontreated control.

Table 33. Effect of seed treatment on SDS, root rot, and yield of soybean.

Treatment, rate/A, and timing[z]	SDS DI[y]	SDS Index[x]	Root rot %[w]	Test weight lb / bu	Yield[v] bu / A
Susceptible + Nontreated control	42.5 a	10.8 a	6.6	56.5	46.2 c
Susceptible + Base	13.8 b	2.6 b	6.8	56.5	56.0 a
Susceptible + ILeVO	12.5 b	2.2 b	3.8	56.8	53.2 ab
Susceptible + Saltro	12.5 b	1.4 b	2.5	56.5	54.8 ab
Susceptible + Zeltera	17.5 b	3.1 b	7.0	56.5	53.5 ab
Susceptible, Base fb Xylem Plus in-furrow 32.0 fl oz/A fb Xylem Plus 24.0 fl oz at R2	17.5 b	3.3 b	5.4	56.7	53.9 ab
Susceptible, Base fb Xyway (2x2) 15.2 fl oz	13.8 b	2.1 b	6.2	56.8	50.6 b
Susceptible + Base + ILeVO + Ceramax	18.8 b	2.8 b	5.6	56.7	54.3 ab
P-value[u]	*0.0031*	*0.0004*	*0.3002*	*0.4563*	*0.0030*

[z] Seed treatments were applied on seeds before planting. In-furrow and 2x2 application was applied in 10 gal/A at planting on 25 Apr. Xylem Plus was applied at full flowering (R2) growth stage.
[y] SDS in each plot was rated for disease incidence (DI) as a percentage of plants with disease symptoms (0=100%) on 30 Aug at R7 (beginning maturity) growth stage.
[x] SDS Index (DX) calculated using the equation: DX = (DI*DS/9). SDS = sudden death syndrome.
[w] Root rot rating was assessed at R4 (full pod) growth stage on 9 Aug. Ten roots per plot were sampled from border rows, gently washed and rated for root rot severity on scale of 0-100%.
[v] Yields were adjusted to 13% and harvested on 2 Oct.
[u] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

SOYBEAN (*Glycine max* '24E453N')
Septoria brown spot; *Septoria glycines*

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Comparison of planting dates and seed treatments on soybean in northwestern Indiana, 2024 (SOY24-09.PPAC).

A trial was established at Pinney Purdue Agricultural Center (PPAC) in Wanatah, IN. The experiment design was a split-plot with four replications. The main plot was planting date and sub-plot seed treatments. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar '24E453N' was planted in 30-inch row spacing at a rate of 8 seeds/ft. Treatments were a factorial arrangement of four planting dates by for seed treatments. Soybeans were planted on 15 Apr (planting date 1), 2 May (planting date 2), 23 May (planting date 3) and 31 May (planting date 4). Stand counts were assessed at cotyledons expanded/first-node stage (VC/V1) growth stage for each planting date. Disease ratings were assessed on 31 Aug at full seed/beginning maturity/full maturity (R6/R7/R8) growth stage. Septoria brown spot (SBS) was rated for disease severity by visually assessing the percentage of symptomatic leaf area in the lower canopy. Ten roots were sampled for outer rows of each plot and rated for root rot severity on a scale of 0-100% and averaged before analysis. The two center rows of each plot were harvested on 30 Sep and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

In 2024, weather conditions were not favorable for the disease and little disease developed in plots. Main effects of planting date and seed treatment are presented since there was only an interaction for stand count and not the other dependent variables. Soybean stand was the highest at planting on 23 May compared to the other planting dates (Table 34). Septoria brown spot (SBS) was lowest at the latest planting date on 31 May. The planting dates of 15 Apr and 2 May significantly increased root rot over planting at 23 and 31 May. Harvest moisture was highest at planting on 2 May, but was not significantly different from the planting date of 15 Apr. Planting on 23 and 31 May increased test weight over the earlier planting, while the highest soybean yield occurred when planted on 15 Apr or 2 May. CruiserMaxx APX with and without Thiamethoxam increased soybean stand compared to the nontreated control and Thiamethoxam only seed treatment. Seed treatment of CruiserMaxx + Thiamethoxan had significantly higher SBS severity compared nontreated control and Thiamethoxam. No significant differences were observed between seed treatments for root rot and harvest moisture. CruiserMaxx APX without Thiamethoxam and the nontreated control had a higher test weight compared to CruiserMaxx APX + Thiamethoxam. No significant interactions between seed treatments were observed on yield of soybean.

Table 34. Effect of planting dates and seed treatments on stand count, SBS, root rot, and yield of soybean.

Planting dates and seed treatments[z]	Stand count #/A	SBS[y] %	Root rot[x] %	Moisture %	Test weight lb/bu	Yield[w] Bu/A
Planting date 1 (15 Apr)	89,897 c	5.9 a	7.7 a	14.2 ab	55.8 c	56.9 a
Planting date 2 (2 May)	103,673 b	6.6 a	5.1 b	14.4 a	56.3 b	54.9 a
Planting date 3 (23 May)	133,893 a	6.8 a	3.1 c	13.9 c	56.9 a	48.0 b
Planting date 4 (31 May)	110,751 b	2.6 b	2.4 c	14.1 bc	56.7 a	45.7 b
Nontreated control	106,450 b	5.1 b	4.7	14.1	56.5 a	51.8
CruiserMaxx APX + Thiamethoxam	118,864 a	5.6 ab	3.8	14.2	56.2 b	52.0
Thiamethoxam	97,357 c	4.8 b	5.2	14.2	56.4 ab	51.1
CruiserMaxx APX without Thiamethoxam	115,543 a	6.6 a	4.7	14.1	56.6 a	50.5
P-value *planting date*[v]	*0.0001*	*0.0001*	*0.0001*	*0.0025*	*0.0001*	*0.0001*
P-value *seed treatment*	*0.0001*	*0.0083*	*0.3086*	*0.7814*	*0.0185*	*0.5842*
P-value *planting date*seed treatment*	*0.0059*	*0.1634*	*0.9500*	*0.6374*	*0.1250*	*0.7377*

[z] Seed treatments applied prior to planting at 10 g AI/100 kg seed.
[y] Foliar disease severity rated on scale of 0-100% of symptomatic leaf area in the lower canopy. SBS = Septoria brown spot.
[x] Root rot visually assessed as a percentage (0-100%) of dark discoloration on 10 roots per plot.
[w] Yields were adjusted to 13% moisture and harvest on 3 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

SOYBEAN (*Glycine max* 'P29A19E')
White mold; *Sclerotinia sclerotiorum*

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Fungicide evaluation for white mold in soybean in northwestern Indiana, 2024 (SOY24-14.PPAC).

A trial was established at the Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean variety 'P29A19E' was planted in 30-inch row spacing at a rate of 8 seeds/ft on 22 May. Fungicides were applied at 15 gal/A and 40 psi using a CO_2 backpack at R1 and a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart at 5 mph at R2 and R3. Fungicides were applied on 12 Jul at the beginning bloom (R1), 19 Jul at full bloom (R2), and 25 Jul at beginning pod (R3) growth stages. The two center rows of each plot were harvested on 2 Oct and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for disease development. No white mold was developed in plots. There was no significant effect of treatment on percent canopy greenness, defoliation, harvest moisture, test weight, and yield of soybean (Table 35).

Table 35. Effect of treatment on canopy greenness, defoliation, and yield of soybean.

Treatment, rate/A and timing[z]	**Canopy green**[y] **%**	**Defoliation**[x] **%**	**Harvest moisture %**	**Test weight lb/bu**	**Yield bu/A**[w]
Nontreated control	16.3	13.8	13.9	55.4	62.1
Endura 70 WDG 8.0 oz at R1	11.8	18.8	13.9	55.4	60.1
Endura 70 WDG 8.0 oz at R2	18.8	12.5	13.9	55.2	57.2
Endura 70 WDG 8.0 oz at R3	24.3	10.0	13.9	55.1	58.4
Endura 70 WDG 8.0 oz at Sporecaster (R2)	20.5	13.8	13.8	55.3	62.3
P-value[v]	*0.2405*	*0.1465*	*0.8776*	*0.9529*	*0.6223*

[z] Fungicides were applied on 12 Jul at the beginning bloom (R1), 19 Jul at full bloom (R2), and 25 Jul at beginning pod (R3) growth stages.
[y] Canopy greenness was visually assessed percentage (0-100%) of crop canopy green on 16 Sep.
[x] Defoliation rated on scale of 0-100% in plot on 16 Sep.
[w] Yields were adjusted to 13% moisture and harvest on 2 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

SOYBEAN (*Glycine max* 'AG26XF1')
Sudden death syndrome; *Fusarium virguliforme*

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Evaluation of seed treatments for sudden death syndrome in northwestern Indiana (SOY24-15.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'AG26XF1' was planted in 30-inch row spacing at a rate of 8 seeds/ft on 25 Apr. Seed treatment applied by cooperator. Inoculum of *Fusarium virguliforme* was applied in the seedbed at 1.25 g/ft at planting. Stand count were assessed on 28 May at V2/V3 growth stage. Ten roots were sampled from outer rows of each plot on 9 Aug at full pod (R4) growth stage, gently washed and dried to determine root dry weight (g). The two center rows of each plot were harvested on 2 Oct and yields were adjusted to 13% moisture. A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for the disease, only low levels of sudden death syndrome (SDS) were detected. Seed treatments of Base+ Ilevo and Base alone increase soybean stand at V2/V3 (Table 36). There were no significant differences between treatments for SDS incidence and severity (data not shown). All seed treatments increased root dry weight over nontreated control, except Base alone, Base + CeraMax + Germate Plus, and Base + TBZ + Headsup + Biost 2nd Gen + Ascribe SAR. No significant differences were detected between treatments for green stem, moisture, test weight, and yield of soybean.

Table 36. Effect of seed treatment on stand count, root dry weight, green stem, and yield of soybean.

Treatment[z]	Stand count[y] #/A	Root dry weight[x] g	Green stem[w] %	Harvest moisture %	Test weight lb/bu	Yield[v] bu/A
Nontreated control	91,726 cde	16.7 c	1.0	15.3	55.4	47.3
Base	105,452 ab	19.5 bc	0.8	15.3	55.1	51.0
Base + CeraMax + Germate Plus	97,608 bc	21.7 abc	1.0	15.3	55.5	44.4
Base + Avodigen + Adaplan + Ethos Elite	84,754 e	27.6 a	1.0	15.3	55.7	47.4
Base + TBZ + Headsup + Biost 2nd Gen + Ascribe SAR	87,586 de	18.9 bc	0.5	15.3	55.6	45.2
Base + Avodigen + Adaplan + Ethos Elite + TBZ + Headsup + BioST + Ascribe + CeraMax + Germate Plus	94,776 cd	24.7 ab	1.0	15.2	55.3	48.2
Base + ILEVO	111,552 a	23.1 ab	1.8	15.3	55.4	53.0
P-value[u]	*0.0001*	*0.0200*	*0.2778*	*0.9352*	*0.6372*	*0.1830*

[z] Seed treatments applied prior to planting by cooperator. All plots inoculated with *F. virguliforme* at planting on 25 Apr.
[y] Stand count were assessed on 28 May at V2/V3 growth stage.
[x] Green stem rated as percent of plot (0-100%) just prior to harvest on 2 Oct.
[w] Ten roots were sampled from outer rows of each plot on 9 Aug at full pod (R4) growth stage, gently washed and dried to determine root dry weight (g).
[v] Yields were adjusted to 13% moisture and harvest on 2 Oct.
[u] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

SOYBEAN (*Glycine max*)
Sudden death syndrome; *Fusarium virguliforme*

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Evaluation of planting date and sulfur for sudden death syndrome on soybean in northwestern Indiana, 2024 (SOY24-20.PPAC)

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experimental design was split-plot with four replications. The main plot was planting date (April and May), and sub-plot were a factorials arrangement of inoculation (nontreated and inoculated) by treatment (nontreated control, ammonium sulfate, ammonium thiosulfate, and calcium sulfate). Plots were 10-ft wide and 30-ft long, consisting of four rows, and the two center rows were used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean seeds were planted in 30-inch row spacing at a rate of 8 seeds/ft. Soybeans were planted on 25 Apr (April Planting) and on 22 May (May Planting). *Fusarium virguliforme* was inoculated at planting at 1.25 g/ft. Sulfur treatments were applied on 26 April and 23 May following planting, with a resultant sulfur rate of 20 lb/A. Ammonium sulfate 83 lb/A and calcium sulfate at 117 lb/A were hand-applied. Ammonium thiosulfate was applied at 6.9 gal/A at 15 GPA at 28-29 psi using a CO_2 backpack sprayer equipped with a 10-ft boom, fitted with eight TJ-VS 8002 nozzles spaced 15-in. apart at 3 mph. Disease ratings were assessed on 4 Sep at full seed (R6) growth stage. Sudden death syndrome (SDS) in each plot was rated for disease incidence (DI) a percentage of plants with disease symptoms (0-100%) and disease severity (DS) on a scale of 1-9 where 1 refers to low disease pressure and 9 refers to premature death of the plant. A SDS Index (DX) was then calculated using the equation: DX= (DI x DS/9). The two center rows of each plot were harvested on 2 Oct and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for the disease. Sudden death syndrome (SDS) was present in the trial and reached low severity. There were significant interactions between inoculum and treatment, but no significant interactions with planting date except for SDS severity (DS), therefore main effects of planting date and sub-effects of inoculum by treatment were assessed (Table 37). SDS incidence (DI) and Index was significantly lower in soybeans planted on 22 May compared to 25 Apr. Planting on 22 May significantly increased canopy greenness on 4 Sep. There was no significant difference between plantings dates for harvest moisture and soybean yield. There were no significant differences between inoculation and treatments for SDS severity, SDS Index, canopy greenness, harvest moisture, and yield of soybean.

Table 37. Effect of planting date, inoculation, sulfur treatment on and SDS, canopy greenness, and yield of soybean.

Treatments and rate[z]	**SDS DI**[y]	**SDS Index**[x]	**Canopy green %**	**Harvest moisture %**	**Yield**[w] **bu/A**
April Planting (25 Apr)	3.5 a	0.6 a	75.3 b	13.3	75.7
May Planting (22 May)	0.9 b	0.1 b	91.7 a	13.3	76.2
Non-inoculated; Nontreated control	2.8	0.5	83.0	13.0	75.8
Non-inoculated; Ammonium sulfate 83 lb	1.3	0.2	85.3	13.4	77.0
Non-inoculated; Ammonium thiosulfate 6.9 gal	1.6	0.2	80.7	13.3	73.5
Non-inoculated; Calcium sulfate 117 lb	1.8	0.2	83.8	13.6	74.4
Inoculated; Nontreated control	3.3	0.6	82.2	13.3	75.1
Inoculated; Ammonium sulfate 83 lb	2.0	0.3	84.1	13.4	76.3
Inoculated; Ammonium thiosulfate 6.9 gal	2.5	0.4	85.2	13.1	77.6
Inoculated; Calcium sulfate 117 lb	2.3	0.4	83.7	13.2	77.4
P-value *planting date*[v]	*0.0003*	0.0005	*0.0016*	*0.8608*	*0.7022*
P-value *inoculum*	*0.0505*	0.1009	*0.5865*	*0.8103*	*0.3495*
P-value *sulfur treatment*	*0.0314*	0.0108	*0.5604*	*0.8093*	*0.9291*
P- value *planting date*treatment*	*0.7795*	0.2759	*0.1286*	*0.7034*	*0.7754*
P-value *planting date*inoculum*	*0.3868*	0.1928	*0.8107*	*0.8182*	*0.2544*
P-value *inoculum*treatment*	*0.9667*	0.9160	*0.2531*	*0.7089*	*0.5205*
P-value *planting date*inoculum*treatment*	*0.7396*	0.7354	*0.0645*	*0.6692*	*0.7659*

[z] *Fusarium virguliforme* grown on sorghum were inoculated at planting. Sulfur treatments were applied by hand following planting with a resultant sulfur rate of 20 lb/A.0. [y] SDS in each plot was rated for disease incidence (DI) as a percentage of plants with disease symptoms (0-100%) [x] SDS Index (DX) calculated using the equation: DX= (DI x DS/9). [w] Yields were adjusted to 13% moisture and harvested on 2 Oct. [v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

SOYBEAN (*Glycine max* 'P29A19E')
White mold; *Sclerotinia sclerotiorum*

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Fungicide evaluation for white mold in soybean in northwestern Indiana, 2024 (SOY24-25.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'P29A19E' was planted in 30-inch row spacing at a rate of 8 seeds/ft on 22 May. Fungicides were applied on 12 Jul at the beginning bloom (R1) and 25 Jul at the beginning pod (R3) growth stages. Fungicides were applied at 15 gal/A and 40 psi using a CO_2 backpack at R1 and a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart at 5 mph at R3. Disease ratings were rated on 4 Sep. White mold disease incidence assessed by counting the number of plants out of 30 in each plot with symptoms. For disease severity, each plant that is observed rated according to the following disease category: 0 = no disease; 1 = lateral branches with white mycelium and lesions; 2 = main stem with white mycelium and sclerotia present; 3 = entire plant wilted/plant death. White mold disease severity index (DSI) = (Total of severity score (0-3) from 30 plants)/0.9 (Grau et al 1982). The two center rows of each plot were harvested on 2 Oct and yields were adjusted to 13% moisture. A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for disease. White mold was the most prominent disease and reached low severity. No significant differences were detected between fungicide programs and nontreated control for white mold DSI, except for Miravis Neo at R1 (Table 38). There was no significant effect of treatment on the canopy greenness, harvest moisture, test weight, and yield of soybean.

Table 38. Effect of treatment on white mold, canopy greenness, and yield of soybean.

Treatment, rate/A and timing [z]	White mold DSI [y] %	Canopy green [x] %	Harvest moisture %	Test weight lb/bu	Yield [w] bu/A
Nontreated control	0.0 b	7.8	13.9	55.7	58.0
Delaro Complete 3.82 SC 8.0 fl oz at R1	0.3 b	10.0	14.0	55.4	61.0
Delaro Complete 3.82 SC 8.0 fl oz at R1 fb Delaro Complete 3.82 SC 8.0 fl oz at R3	0.0 b	7.8	14.0	55.1	61.3
Propulse 3.34 SC 8.0 fl oz at R1	0.0 b	6.5	13.8	55.5	59.6
Propulse 3.34 SC 8.0 fl oz at R1 fb Delaro Complete 3.82 SC 8.0 fl oz at R3	0.0 b	13.8	13.9	55.6	59.0
Viatude SC 10.0 fl oz at R1	0.0 b	21.3	13.9	55.4	57.3
Miravis Neo 2.5 SC 13.7 fl oz at R1	1.4 a	6.3	14.0	55.3	59.6
Endura 0.7 DF 6.0 fl oz at R1	0.3 b	17.5	13.9	55.6	59.3
P-value [v]	*0.0333*	*0.1121*	*0.2534*	*0.4722*	*0.8076*

[z] Fungicides were applied on 12 July at the R1 (beginning bloom) and 25 July at the R3 (beginning pod) growth stages, and all treatments contained a non-ionic surfactant (Preference) at a rate of 0.25% v/v.
[y] White mold disease severity index (DSI) = (Total of severity score (0-3) from 30 plants)/0.9.
[x] Canopy greenness was visually assessed percentage (0-100%) of crop canopy green on 16 Sep.
[w] Yields were adjusted to 13% moisture and harvest on 2 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

SOYBEAN (*Glycine max* 'P29A19E')
White mold; *Sclerotinia sclerotiorum*

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Evaluating biologicals for disease management soybean in northwestern Indiana, 2024 (SOY24-26.PPAC,).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'P29A19E' was planted in 30-inch row spacing at a rate of 8 seeds/ft on 22 May. Fungicides were applied on 19 Jul at the full bloom (R2) growth stage. Fungicide and biologicals were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Disease ratings were rated on 4 Sep, but no disease was detected. Stand count were taken at V8 growth stage on 3 Jul. Canopy greenness was visually assessed percentage (0-100%) of crop canopy green. The two center rows of each plot were harvested on 2 Oct and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for the diseases. No disease and no phytotoxicity were detected in trial. There was no significant effect of treatment stand count (Table 39). There was no significant effect of treatment on canopy greenness, harvest moisture, test weight, and yield of soybean.

Table 39. Effect of treatment on stand count, canopy greenness, and yield of soybean.

Treatment and rate/A[z]	Stand count[y] #/A	Canopy green[x] %	Harvest moisture %	Test weight lb/bu	Yield[w] bu/A
Nontreated control	120,921	9.3	13.9	56.6	53.6
Approach, 8.0 fl oz	126,150	18.0	14.0	55.5	59.7
Double Nickel, 2.0 QT	125,496	5.5	13.8	56.1	55.8
Serifel 16.0 fl oz	118,742	17.0	13.9	55.6	56.7
Actinovate 12.0 oz	124,843	12.5	13.8	55.5	60.0
BotryStop 2.0 lb	128,329	9.3	13.8	58.3	54.3
P-value[v]	*0.2974*	*0.2840*	*0.8489*	*0.2744*	*0.4095*

[z] Fungicide and biologicals were applied on 19 July at the R2 growth stage.
[y] Stand count were taken at V8 growth stage on 3 Jul.
[x] Canopy greenness was visually assessed percentage (0-100%) of crop canopy green on 16 Sep.
[w] Yields were adjusted to 13% moisture and harvest on 2 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

SOYBEAN (*Glycine max* 'P29A19E')
White mold; *Sclerotinia sclerotiorum*

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Fungicide evaluation for white mold in soybean in northwestern Indiana, 2024 (SOY24-31.PPAC).

A trial was established at the Pinney Purdue Agricultural Center (PPAC) in Porter County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'P29A19E' was planted in 30-inch row spacing at a rate of 8 seeds/ft on 22 May. *Sclerotinia sclerotiorum* infested sorghum 1.25 g/ft was applied in-furrow at planting. Fungicides were applied on 12 Jul at the beginning bloom (R1), 19 Jul 7 days after application (DAA) at full bloom (R2), and 25 Jul 12 DAA at the beginning pod (R3) growth stages. Fungicides were applied at 15 gal/A and 40 psi using a CO_2 backpack at R1 and a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart at 5 mph at R2 and R3. Disease ratings were rated on 4 Sep at full seed (R6) growth stage. White mold disease incidence assessed by counting the number of plants out of 30 in each plot with symptoms. For disease severity, each plant that is observed rated according to the following disease category: 0 = no disease; 1 = lateral branches with white mycelium and lesions; 2 = main stem with white mycelium and sclerotia present; 3 = entire plant wilted/plant death. White mold disease severity index (DSI) = (Total of severity score (0-3) from 30 plants)/0.9 (Grau et al 1982). Canopy greenness was visually assessed percentage (0-100%) of crop canopy green on 16 Sep. The two center rows of each plot were harvested on 2 Oct and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for the disease. White mold was the most prominent disease in the trial but only reached low severity. No significant differences were detected between fungicide programs and nontreated control for white mold DI and DSI (Table 40). There was no significant effect on the percent canopy greenness, harvest moisture, test weight, and yield of soybean.

Table 40. Effect of treatment on white mold, canopy greenness, and yield of soybean.

Treatment, rate/A, and timing [z]	White mold DI [y]	White mold DSI [x]	Canopy % green [w]	Harvest moisture %	Test weight lb/bu	Yield [v] bu/A
Nontreated control	0.5	1.4	3.0	14.2	56.1	54.6
Domark 5.0 fl oz at R1 fb Domark 5.0 fl oz at 7 DAA	1.0	3.1	5.5	14.2	55.9	52.7
Domark 5.0 fl oz at R1 fb Domark 5.0 fl oz at 12 DAA	0.3	0.6	1.5	13.7	54.5	52.1
Affiance 10.0 fl oz at R1 fb Affiance 10.0 fl oz at 7 DAA	0.3	0.6	6.3	14.5	55.0	51.8
Affiance 10.0 fl oz at R1 fb Affiance 10.0 fl oz at 12 DAA	0.0	0.0	1.0	14.3	57.1	57.0
Affiance 14.0 fl oz at R1 fb Affiance 14.0 fl oz at 12 DAA	0.5	1.4	1.8	14.1	55.4	56.1
Domark 5.0 fl oz + Topsin 20 fl oz at R1 fb Domark 5.0 fl oz + Topsin 20 fl oz at 12 DAA	0.3	0.8	0.8	14.1	55.8	57.8
Affiance 10.0 fl oz at R1 fb Endura 7.5 oz at 12 DAA	0.5	1.4	1.3	14.0	53.2	53.2
P-value [u]	*0.5731*	*0.4375*	*0.1662*	*0.2858*	*0.5006*	*0.6592*

[z] Fungicides were applied on 12 Jul at the beginning bloom (R1), 19 Jul 7 days after application (DAA) at full bloom (R2), and 25 Jul 12 DAA at the beginning pod (R3) growth stages.
[y] White mold disease incidence assessed by counting the number of plants out of 30 in each plot with symptoms on 4 Sep at full seed (R6) growth stage.
[x] White mold disease severity index (DSI) = (Total of severity score (0-3) from 30 plants)/0.9.
[w] Canopy greenness was visually assessed percentage (0-100%) of crop canopy green on 16 Sep.
[v] Yields were adjusted to 13% moisture and harvest on 2 Oct.
[u] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

CORN (*Zea mays* 'P0574AMXT')
Gray leaf spot; *Cercospora zeae-maydis*
Southern rust; *Puccinia polysora*
Tar spot; *Phyllachora maydis*

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Fungicide comparison for foliar disease in corn in southwestern Indiana, 2024 (COR24-11.SWPAC).

A trial was established at the Southwest Purdue Agricultural Center (SWPAC) in Knox County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was soybean. Standard practices for grain corn production in Indiana were followed. Corn hybrid 'P0574AMXT' was planted in 30-inch row spacing at a rate of 27,000 seeds/A on 11 May. Fungicide applications were applied on 15 Jul at tassel/silk (VT/R1) growth stage. All foliar fungicide applications were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Disease ratings were assessed on 19 Aug at dent (R5) growth stage. Tar spot, gray leaf spot (GLS), and southern rust (SR) were rated for disease severity by visually assessing the percentage of affected leaf area (0-100%) at the ear leaf on five plants per plot and averaged before analysis. The two center rows of each plot were harvested on 7 Oct and yields were adjusted to 15.5% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for disease development. Tar spot, gray leaf spot (GLS), and southern rust (SR) were present in the trial, but only reached low levels. All fungicide treatments reduced the total foliar disease (tar spot, gray leaf spot and southern rust) as compared to the nontreated control, except Miravis Neo (Table 41). No significant differences between treatments were observed for harvest moisture, test weight and yield of corn.

Table 41. Effect of treatment on foliar disease severity and yield of corn.

Treatment and rate/A[z]	Foliar disease severity[y] %	Harvest moisture %	Test weight lb/bu	Yield[x] bu/A
Nontreated control	2.4 a	13.7	17.5	182.3
Veltyma 3.34 SC 7.0 fl oz	0.3 b	14.2	20.0	178.0
Delaro Complete 3.82 SC 8.0 fl oz	0.8 b	13.9	15.0	190.7
Aproach Prima 2.34 SC 6.8 fl oz	0.9 b	14.3	7.5	194.1
Adastrio 4.0 SC 8.0 fl oz	0.7 b	14.0	0.0	190.4
Miravis Neo 2.5 EC 13.7 fl oz	2.0 a	13.8	10.0	185.1
Trivapro 2.21 SE 13.7 fl oz	0.4 b	13.9	32.5	179.4
Headline AMP 1.68 SC 10.0 fl oz	0.4 b	13.9	17.5	189.6
Proline 480 SC 5.7 fl oz	1.0 b	14.0	25.0	187.9
Quadris 2.08 SC 6.0 fl oz	0.9 b	13.7	27.5	184.3
Tilt 3.6 EG 4.0 fl oz	0.7 b	14.0	20.0	191.6
P-value[w]	0.0003	*0.8982*	*0.2198*	*0.3062*

[z] Fungicides were applied on 15 Jul at tassel/silk (VT/R1) growth stage.
[y] Foliar diseases were visually assessed as the percentage (0-100%) of affected leaf area on five plants in each plot at the ear leaf on 19 Aug at dent (R5) growth stage (included tar spot, gray leaf spot and southern rust).
[x] Yields were adjusted to 15.5% moisture and harvested on 7 Oct.
[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

CORN (Zea mays 'P0574AM')
Tar spot; *Phyllachora maydis*
Gray leaf spot; *Cercospora zeae-maydis*
Southern rust; *Puccinia polysora*

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Fungicide comparison for foliar disease in corn in southwestern Indiana, 2024 (CORN 24-30.SWPAC).

A trial was established at the Southwest Purdue Agricultural Center (SWPAC) in Knox County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was soybean. Standard practices for grain corn production in Indiana were followed. Corn hybrid 'P0574AMXT' was planted in 30-inch row spacing at a rate of 27,000 seeds/A on May. All fungicide were applied at 15 gal/A and 40 psi using either a CO_2 backpack spray on (V9) or a Lee self-propelled sprayer on (VT/R1) equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicides were applied on 27 Jun at V9 and 15 July at the tassel/silk (VT/R1) growth stages. Disease ratings were assessed on 19 Aug at dent (R5) growth stage. Tar spot, gray leaf spot (GLS), and southern rust (SR) were rated for severity by visually assessing the percentage of symptomatic leaf area (0-100%) per leaf on five plants in each plot at the ear leaf. Values for the five leaves were averaged before analysis. The two center rows of each plot were harvested on 7 Oct and yields were adjusted to 15.5% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for the disease development. Tar spot, gray leaf spot (GLS), and southern rust (SR) were detected in plots, but reached low severity. Tar spot was significantly reduced by Veltyma at R1, Topguard at V9 followed by (fb) Adastrio at R1, Adastrio at V9 fb Topguard at R1 and Delaro Complete + OR-99EPA at R1 as compared to nontreated control (Table 42). All fungicide programs significantly reduced southern rust as compared to nontreated control. There was no significant effect of treatment on GLS severity, harvest moisture, test weight, and yield of corn.

Table 42. Effect of treatment on foliar disease and yield of corn.

Treatment, rate/A, and timing[z]	**Tar spot**[y] **% severity**	**GLS**[y] **% severity**	**SR**[y] **% severity**	**Harvest moisture %**	**Test weight lb/bu**	**Yield**[x] **bu/A**
Nontreated control	0.3 a	0.1	0.5 a	14.2	57.8	189.4
Veltyma 7.0 fl oz + NIS 0.25% V/V at R1	0.2 bc	0.1	0.1 b	14.1	57.8	182.1
Delaro Complete 8.0 fl oz + NIS 0.25% V/V at R1	0.3 ab	0.1	0.1 b	14.3	57.9	189.1
Topguard 8.0 fl oz at V9 fb Adastrio 8.0 fl oz + NIS 0.25% V/V at R1	0.1 c	0.0	0.1 b	14.3	57.8	195.2
Adastrio 8.0 fl oz at V9 fb Topguard EQ 7.0 fl oz + NIS 0.25% V/V at R1	0.2 bc	0.0	0.1 b	14.3	57.8	198.2
Veltyma 7.0 fl oz + OR-099EPA 0.4% v/v at R1	0.3 a	0.1	0.2 b	14.2	58.5	184.8
Delaro Complete 8.0 fl oz + OR-099EPA 0.4% v/v at R1	0.1 c	0.1	0.1 b	14.1	57.7	193.5
P-value[w]	*0.0094*	*0.0855*	*0.0001*	*0.9518*	*0.6806*	*0.1258*

[z] Fungicides were applied on 27 Jun at V9 and 15 July at the tassel/silk (VT/R1) growth stages, fb= followed by.
[y] Foliar disease severity was visually assessed percentage (0-100%) of affected leaf area on five plants in each plot at the ear leaf on 19 Aug at dent (R5) growth stage. GLS =gray leaf spot; SR = southern rust.
[x] Yields were adjusted to 15.5% moisture and harvest on 7 Oct.
[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

SOYBEAN (*Glycine max* 'P29A19E')
Frogeye leaf spot; *Cercospora sojina*
Septoria brown spot; *Septoria glycines*

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Evaluation of fungicides for foliar diseases on soybean in southwestern Indiana, 2024 (SOY24-02.SWPAC).

A trial was established at the Southwest Purdue Agricultural Center (SWPAC) in Knox County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'P29A19E' was planted in 30-inch row spacing at a rate of 150,000 seed/A on 24 May. All fungicide were applied at 15 gal/A and 40 psi using a Lee self-propelled sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Fungicides were applied on 15 July at the beginning pod (R3) growth stage. Foliar disease ratings were rated on 19 Aug at full seed (R6) growth stage. The two center rows of each plot were harvested on 11 Sep and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for disease development. Septoria brown spot (SBS) and frogeye leaf spot (FLS) were present in the trial, but only reached low levels. There was no significant effect on harvest moisture, test weight, and yield of soybean (Table 43).

Table 43. Effect of treatment on yield of soybean.

Treatment and rate/A[z]	Harvest moisture %	Test weight lb/bu	Yield[y] bu/A[y]
Nontreated control	9.6	60.2	61.6
Topguard EQ 4.29 SC 5.0 fl oz	10.1	55.5	56.6
Lucento 4.17 SC 5.0 fl oz	10.7	61.4	61.1
Trivapro 2.21 SE 13.7 fl oz	10.0	59.5	56.4
Quadris 2.08 SC 6.0 fl oz	10.9	62.4	58.9
Veltyma 3.34 SC 7.0 fl oz	11.2	61.0	60.1
Revytek 4.44 SC 8.0 fl oz	11.2	61.0	61.5
Echo 2.21 SE 36.0 fl oz + Folicur 3.6 FL 4.0 fl oz + Topsin 4.5 SC 4.5 fl oz	11.9	60.7	58.7
Delaro Complete 3.82 SC 8.0 fl oz	12.0	60.3	58.3
Miravis Neo 2.5 EC 13.7 fl oz	10.8	61.8	59.9
Topsin 4.5 SC 4.5 20.0 fl oz	10.2	61.1	59.5
P-value[x]	*0.2181*	*0.3463*	*0.5801*

[z] Fungicides were applied on 15 July at the R3 (beginning pod) growth stage, and all treatments contained a non-ionic surfactant (Preference) at a rate of 0.25% v/v.
[y] Yields were adjusted to 13% moisture and harvest on 11 Sep.
[x] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

SOYBEAN (*Glycine max* 'P29A19E')
Septoria brown spot; *Septoria glycines*
Frogeye leaf spot; *Cercospora sojina*

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Evaluation of fungicides for foliar diseases on soybean in southwestern Indiana, 2024 (SOY24-21.SWPAC).

A trial was established at the Southwest Purdue Agricultural Center (SWPAC) in Knox County, IN. The experiment was a randomized complete block design with four replications. Plots were 10-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'P29A19E' was planted in 30-inch row spacing at a rate of 150,000 seed/A on 24 May. Fungicides were applied on 27 Jun at V5 and 15 July at the beginning pod (R3) growth stage. All fungicide were applied at 15 gal/A and 40 psi using either a CO_2 backpack spray (V5) or a Lee self-propelled sprayer (R3) equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart. Foliar disease ratings were rated on 19 Aug at full seed (R6) growth stage. Septoria brown spot (SBS) and frogeye leaf spot (FLS) were rated for disease severity by visually assessing the percentage of symptomatic leaf area in the canopy. The two center rows of each plot were harvested on 11 Sep and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for disease development. Septoria brown spot (SBS) and frogeye leaf spot (FLS) were present in the trial, but only reached low levels. All treatments significantly reduced SBS over the nontreated control (Table 44). There was no significant effect of treatment on FLS severity. There was no significant effect on harvest moisture, test weight, and yield of soybean.

Table 44. Effect of treatment on foliar disease and yield of soybean.

Treatment, rate/A, and timing [z]	SBS [y] %	FLS [y] %	Harvest moisture %	Test weight lb/bu	Yield bu/A [x]
Nontreated control	2.2 a	0.2	14.4	59.4	65.2
Lucento 4.17 SC 5.0 fl oz at R3	0.3 b	0.1	10.5	60.9	63.4
Adastrio 4.0 SC 8.0 fl oz at R3	0.3 b	0.1	13.2	59.0	63.5
Topguard EQ 4.29 SC 7.0 fl oz at V4 fb Lucento 4.17 SC 5.0 fl oz at R3	0.3 b	0.1	10.9	60.2	66.6
Topguard EQ 4.29 SC 7.0 fl oz at V4 fb Adastrio 4.0 SC 8.0 fl oz at R3	0.3 b	0.1	11.6	60.4	64.7
Delaro Complete 3.82 SC 8.0 fl oz at R3	0.4 b	0.1	12.3	58.9	66.7
Revytek 4.44 SC 8.0 fl oz at R3	0.2 b	0.1	13.8	59.3	65.1
P-value [w]	*0.0357*	*0.1108*	*0.2010*	*0.8983*	*0.8370*

[z] Fungicides were applied on 27 Jun at V5 and 15 July at the R3 (beginning pod) growth stage, and all treatments contained a non-ionic surfactant (Preference) at a rate of 0.25% v/v.
[y] Foliar disease severity rated on scale of 0-100% of canopy within a plot with disease symptoms on 19 Aug at full seed (R6) growth stage. SBS = Septoria brown spot. FLS=frogeye leaf spot.
[x] Yields were adjusted to 13% moisture and harvest on 11 Sep.
[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

WHEAT (*Triticum aestivum* 'P25R40')
Fusarium head blight; *Fusarium graminearum*

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Evaluation of fungicide efficacy for Fusarium head blight of wheat in southwestern Indiana, 2024 (WHT24-03.SWPAC)

A trial was established at the Southwest Purdue Agricultural Center (SWPAC) in Knox County, IN. The experiment was a randomized complete block design with four replications. Plots were 7.5-ft wide and 20-ft long, consisted of 12 rows spaced 7.5 in. apart, and the center of each plot was used for evaluation. The previous crop was corn. Wheat cultivar 'P25R40' was planted in 7.5-inch row spacing using a drill on 22 Oct 2023. All fungicide applications were applied at 15 gal/A and 40 psi using a CO_2 backpack sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart and directed forward and backward at 45-degree angle. Fungicides were applied on 1 May at the Feekes growth stage 10.5.1 and 5 days after on 6 May. All plots were inoculated with a mixture of isolates of *Fusarium graminearum* endemic to Indiana on 1 May with a spore suspension (50,000 spores/ml) applied at 300 ml/plot. Disease ratings were assessed on 23 May. Fusarium head blight (FHB) incidence was measured as the number of infected heads out of 60 plants in each plot and calculated as a percentage. Fusarium head blight (FHB) severity was rated by visually assessing the percentage (0-100%) of the infected heads. The FHB index was calculated as (% FHB incidence multiplied by average FHB severity) /100 per plot. Values for each plot were averaged before analysis. The eight center rows of each plot were harvested with a Kincaid plot combine on 18 Jun and yields were adjusted to 13.5% moisture for comparison. A subsample of grain was taken from each plot and partitioned for deoxynivalenol (DON) analysis completed by the University of Minnesota DON testing lab and to determine Fusarium damage kernels (FDK) by visually assessing the percentage (0-100%) of the infected heads. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were favorable for Fusarium head blight (FHB). Fusarium head blight (FHB) incidence, severity, and index was significantly reduced by all fungicide applications when compared to the nontreated control, except Miravis Era (Table 45). The percent of FDK was significantly reduced by all fungicide programs over nontreated control, except Prosaro 421SC and Sphaerex 2.50SC. The concentration of deoxynivalenol (DON) was significantly reduced by all fungicide applications over nontreated control, except by Prosaro 421SC. All treatments increased yield over nontreated control, except Miravis Era.

Table 45. Effect of fungicide on Fusarium head blight (FHB), Fusarium damaged kernels (FDK), DON, and yield of wheat.

Treatment, rate/A, and timing[z]	FHB % incidence[y]	FHB % severity[x]	FHB Index[w]	FDK[v] %	DON[u] ppm	Yield[t] bu/A
Nontreated control	94.6 a	25.0 a	23.8 a	14.0 d	9.4 a	59.6 c
Prosaro 421SC 6.5 fl oz at 10.5.1	60.4 bc	11.2 bc	7.2 bc	9.5 ab	3.6 bc	70.6 a
Miravis Era 10.2 fl oz at 10.5.1	90.8 a	21.0 a	19.3 a	14.5 d	9.1 a	61.2 bc
Miravis Ace 5.2SC 13.7 fl oz at 10.5.1	46.3 bc	9.9 bc	4.6 bc	12.0 bc	3.7 bc	67.2 ab
Prosaro Pro 400SC 10.3 fl oz at 10.5.1	62.9 b	12.6 bc	8.2 bc	10.0 bc	4.3 b	68.2 ab
Sphaerex 2.50SC 7.3 fl oz at 10.5.1	40.0 c	8.8 c	3.5 c	9.3 bc	3.9 bc	71.0 a
Miravis Ace 5.2SC 13.7 fl oz at 10.5.1 fb Prosaro Pro 400SC 10.3 fl oz at 10.5.1 + 5 d	65.4 b	13.7 b	9.2 b	14.5 cd	2.5 bc	68.6 a
Miravis Ace 5.2SC 13.7 fl oz at 10.5.1 fb Sphaerex 2.50SC 7.3 fl oz at 10.5.1 + 5 d	55.8 bc	11.2 bc	6.5 bc	10.8 a	2.1 c	72.8 a
Miravis Ace 5.2SC 13.7 fl oz at 10.5.1 fb Tebuconazole 4.0 fl oz at 10.5.1 + 5 d	55.8 bc	10.3 bc	6.3 bc	12.8 ab	3.0 bc	69.2 a
P-value[s]	*0.0002*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0131*

[z] Fungicides were applied on 1 May at the Feekes growth stage 10.5.1 and 10.5.10 + 5 days after on 6 May. All treatments contained a non-ionic surfactant (Preference) at a rate of 0.125% v/v. All plots were inoculated with a mixture of isolates of *Fusarium graminearum* endemic to Indiana on 1 May with a spore suspension (50,000 spores/ml) applied at 300 ml/plot.
[y] Fusarium head blight (FHB) incidence was measured as the number of infected heads out of 60 plants in each plot and calculated as a percentage on 23 May.
[x] FHB severity was rated by visually assessing the percentage of the infected head
[w] FHB index was calculated as: (% FHB incidence multiplied by average FHB severity)/100 per plot.
[v] Visual assessment of the percentage of Fusarium damaged kernels (FDK) was performed 10 Jul.
[u] Analysis of the mycotoxin deoxynivalenol (DON) completed by the University of Minnesota DON Testing Lab.
[t] Yields were adjusted to 13.5% moisture and harvested on 18 Jun.
[s] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

WHEAT (*Triticum aestivum* 'P25R40' and 'P25R61')
Fusarium head blight; *Fusarium graminearum*

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Evaluation of cultivars and fungicides Fusarium head blight of wheat in southwestern Indiana (WHT24-04_SCAB.SWPAC).

A trial was established at the Southwest Purdue Agricultural Center (SWPAC) in Knox County, IN. The experiment was a strip-plot design with four replications. Plots were 7.5-ft wide and 20-ft long, consisted of 12 rows spaced 7.5 in. apart, and the center of each plot was used for evaluation. The previous crop was corn. On 11 Oct 2023 wheat cultivars 'P25R40' and 'P25R61' were drilled at 7.5 in. spacing. Fungicides were applied on 1 May at the Feekes growth stage 10.5.1. All fungicide applications were applied at 15 gal/A and 40 psi using a CO_2 backpack sprayer equipped with a 10-ft boom, fitted with six TJ-VS 8002 nozzles spaced 20-in. apart and directed forward and backward at 45-degree angle. All plots were inoculated with a mixture of isolates of *Fusarium graminearum* endemic to Indiana on 1 May. Disease ratings were assessed on 23 May. Fusarium head blight (FHB) incidence was measured as the number of infected heads out of 60 plants in each plot and calculated as a percentage (0-100%). FHB severity was rated by visually assessing the percentage (0-100%) of the infected head. The FHB index was calculated as: (% FHB incidence multiplied by average FHB severity)/100 per plot. Values for each plot were averaged before analysis. The eight center rows of each plot were harvested with a Kincaid 8XP combine on 18 Jun and yields were adjusted to 13.5% moisture. A subsample of grain was taken from each plot and partitioned for deoxynivalenol (DON) analysis completed by the University of Minnesota DON testing lab and to determine Fusarium damage kernels (FDK) by visually assessing the percentage (0-100) of the infected heads. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were favorable for Fusarium head blight (FHB). Fusarium head blight (FHB) was the most prominent disease in the trial. Fusarium head blight (FHB) index, FDK visual, and DON were lowest in the resistant cultivar P25R61 (Table 46). There was no difference between cultivars for moisture, test weight and yield. Fusarium head blight (FHB) index was reduced by all fungicide treatments over nontreated controls. Applications of Miravis Ace had the highest percent FDK. The concentration of DON was significantly reduced by all the fungicides over the nontreated controls. There was no difference in treatment for moisture, test weight and yield of wheat.

Table 46. Effect of cultivar and fungicide on Fusarium Head Blight (FHB), Fusarium damaged kernels (FDK), DON, and yield of wheat.

Treatment and rate/A[z]	FHB Index[y]	FDK[x] %	DON[w] ppm	Moisture %	Test weight lb/bu	Yield[v] bu/A
Cultivar						
P25R40 (scab susceptible)	19.1 a	9.0 a	5.3 a	18.3	51.7	66.3
P25R61 (scab resistant)	5.7 b	6.9 b	1.5 b	18.4	51.4	64.7
Fungicide						
Nontreated control, inoculated control	19.8 a	6.5 c	5.2 a	18.2	51.6	65.7
Nontreated, non-inoculated control	18.9 a	9.3 b	5.4 a	18.6	51.7	67.8
Prosaro 421SC 6.5 fl oz	10.6 b	5.4 c	2.7 b	18.4	51.5	65.3
Miravis Ace 5.2SC 13.7 fl oz	8.3 b	12.3 a	2.6 b	18.2	51.6	63.9
Prosaro Pro 400SC 10.3 fl oz	9.7 b	7.3 bc	2.4 b	18.7	51.7	65.2
Sphaerex 2.50SC 7.3 fl oz	7.1 b	7.1 bc	2.0 b	18.3	51.3	65.2
P-value *cultivar*[u]	*0.0001*	*0.0088*	*0.0001*	*0.7559*	*0.5915*	*0.3200*
P-value *fungicide*	*0.0001*	*0.0001*	*0.0001*	*0.5142*	*0.9930*	*0.8078*
P-value *cultivar*fungicide*	*0.2143*	*0.0001*	*0.0022*	*0.3741*	*0.9727*	*0.7003*

[z] Fungicide treatments applied on 1 May at the Feekes growth stage 10.5.1. All fungicide treatments contained a non-ionic surfactant (Preference) at a rate of 0.125% v/v. All plots inoculated with *Fusarium graminearum* spore suspension (50,000 spores/ml) after the treatment at Feekes 10.5.1. Spore suspension applied at 300 ml/plot with handheld sprayer on 1 May.
[y] FHB index was calculated as: (FHB incidence multiplied by average FHB severity)/100 per plot.
[x] Visual assessment of percentage of Fusarium damaged kernels (FDK) was performed on a subset of grain.
[w] Analysis of the mycotoxin deoxynivalenol (DON) completed by the University of Minnesota DON Testing Lab.
[v] Yields were adjusted to 13.5% moisture and harvested on 18 Jun.
[u] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

CORN (*Zea mays* 'P0574AM')
Tar spot; *Phyllachora maydis*
Northern corn leaf blight; *Exserohilum turcicum*

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Evaluation of drone vs. ground fungicide application methods in corn in central Indiana, 2024 (COR24-08.DPAC).

A trial was established at the Davis Purdue Agricultural Center (DPAC) in Randolph County, IN. The experiment was a randomized complete block design with five replications. Plots were 30-ft wide and 380-ft long, consisted of twelve rows, and the two center rows used for evaluation. The previous crop was soybean. Standard practices for grain corn production in Indiana were followed. Corn hybrid 'P0574AM' was planted in 30-inch row spacing at a rate of 32,000 seeds/A on 7 May. Veltyma 3.34 S 7.0 fl oz/A was applied on 26 Jul at blister (R2) growth stage using two different applicators: a Patriot sprayer equipped with a 30-ft boom, fitted with eighteen AIC110006 nozzles spaced 20-in. apart at 10 mph; and a DJI Agras T30 drone with spray pattern using sixteen XRTTeeJet 11001VS nozzles at 10-ft altitude at 15 mph to applied at 2 gal/A and at 8 mph to apply at 5 gal/A. Disease ratings were assessed on 23 Sep at maturity (R6) growth stage. Tar spot stromata severity and northern corn leaf blight (NCLB) were visually assessed as a percentage (0-100%) of symptomatic leaf area on five plants per plot at three locations in each plot and averaged before analysis. Percent canopy greenness was rated by visually assessing the percentage (0-100%) of canopy green on 23 Sep at maturity (R6) growth stage. The trial was harvested on 7 Nov and yields were adjusted to 15.5% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for disease. Tar spot and northern corn leaf blight (NCLB) were the most prominent diseases in the trial and reached moderate severity. Tar spot stromata severity was significantly reduced over the nontreated control by all application methods (Table 47). The drone application at 5 GPA had the lowest level of tar spot, but was not significantly different from the drone application at 2 GPA. All applications significantly reduced NCLB severity over the nontreated control, but there was no difference between application method. There was no significant effect of treatment for canopy greenness, harvest moisture and yield of corn.

Table 47. Effect of different application methods on foliar disease severity, canopy greenness, and yield corn.

Application equipment and GPA[z]	Tar spot[y] %	NCLB[y] %	Canopy green[x] %	Harvest moisture %	Yield[w] bu/A
Nontreated control	15.4 a	5.9 a	9.0	15.2	199.4
DJI Agras T30 Drone at 2 GPA	6.6 bc	0.1 b	19.7	15.1	204.4
DJI Agras T30 Drone at 5 GPA	3.1 c	0.0 b	20.6	15.2	203.3
Ground-rig with at 20 GPA	8.1 b	1.4 b	14.0	15.2	201.9
P-value[v]	*0.0007*	*0.0085*	*0.4102*	*0.2120*	*0.2630*

[z] Fungicide applications were made on 26 Jul at blister (R2) growth stage, Veltyma 3.34 S at 7.0 fl oz/A and contained a non-ionic surfactant (Preference) at a rate of 0.25% v/v. A blue tracer dye was used at 0.25% v/v. GPA = gallons per acre.
[y] Foliar disease severity visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 23 Sep at maturity (R6) growth stage. NCLB = northern corn leaf blight
[x] Canopy greenness visually assessed percentage (0-100%) of canopy green on 23 Sep.
[w] Yields were adjusted to 15.5% moisture and harvested on 7 Nov.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

SOYBEAN (*Glycine max* 'P29A19E')
Septoria brown spot; *Septoria glycines*
Downy mildew; *Peronospora manshurica*
Frogeye leaf spot; *Cercospora sojina*

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Evaluation of drone vs. ground fungicide application methods in soybean in central Indiana, 2024 (SOY24-05.DPAC).

A trial was established at the Davis Purdue Agricultural Center (DPAC) in Randolph County, IN. The experiment was a randomized complete block design with three replications. Plots were 30-ft wide and 594-ft long, consisted of twenty-four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'P29A19E' was planted in 15-inch row spacing at a rate of 140,000 seeds/A on 14 May. Delaro Complete 3.82 SC 8.0 fl oz/A was applied on 26 Jul at beginning pod (R3) and 13 Aug at beginning seed (R5) growth stages using two different applicators: a Patriot sprayer equipped with a 30-ft boom, fitted with eighteen AIC110006 nozzles spaced 20-in. apart at 10 mph; and a DJI Agras T30 drone with spray pattern using sixteen XRTeeJet 11001VS nozzles at 10-ft altitude at 15 mph to applied at 2 gal/A and at 8 mph to apply at 5 gal/A. Disease ratings were assessed on 12 Sep at beginning maturity (R7) growth stage. Frogeye leaf spot (FLS) and downy mildew (DM) were rated in the upper canopy and Septoria brown spot (SBS) was rated in the lower canopy. Disease severity of each disease was visually assessing the percentage (0-100%) of symptomatic leaf area in three locations each plot. All ratings were averaged in each plot before analysis. Soybean plots were harvested on 9 Oct and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for disease. Septoria brown spot (SBS) and frogeye leaf spot (FLS) were the most prominent diseases in the trial and reached low severity. FLS severity was significantly reduced over the nontreated control by all treatments at R3 and R5, but there was no difference between application method or application time (Table 48). There was no significant effect of treatment on downy mildew (DM) and Septoria brown spot (SBS) severity. There was no significant difference between application method and nontreated control for harvest moisture and yield of soybean.

Table 48. Effect of different application methods on disease severity and yield of soybean.

Application equipment, GPA, and timing[z]	FLS[y] %	SBS[y] %	DM[y] %	Moisture %	Yield[x] bu/A
Nontreated control	2.2 a	2.6	0.8	9.7	70.3
DJI Agras T30 Drone 2 GPA at R3	0.5 b	0.7	0.5	9.7	68.5
DJI Agras T30 Drone 5 GPA at R3	0.1 b	1.0	0.3	9.7	69.9
Ground-rig 20 GPA at R3	0.3 b	0.7	0.3	9.7	67.2
DJI Agras T30 Drone 2 GPA at R5	0.4 b	0.9	0.3	9.7	69.2
DJI Agras T30 Drone 5 GPA at R5	0.1 b	0.6	0.3	9.7	68.5
Ground-rig with 20 GPA at R5	0.4 b	0.7	0.4	9.7	65.0
P-value[w]	*0.0399*	*0.1269*	*0.4190*	0.4481	*0.0895*

[z] Fungicide applications were made on 26 Jul at beginning pod (R3), and 13 Aug at beginning seed (R5) growth stages. Delaro Complete 3.82 SC 8.0 fl oz/A and contained a non-ionic surfactant (Preference) at a rate of 0.25% v/v. A blue tracer dye was used at 0.25% v/v. GPA = gallons per acre.

[y] Foliar disease incidence rated on scale of 0-100% of plants with disease symptoms on 12 Sep at full seed (R6) growth stage. FLS = frogeye leaf spot in upper canopy; SBS = Septoria brown spot in lower canopy; DM = downy mildew in upper canopy.

[x] Yields were adjusted to 13% moisture and harvested on 9 Oct.

[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

CORN (*Zea mays* 'P0574AM')
Tar spot; *Phyllachora maydis*
Northern corn leaf blight; *Exserohilum turcicum*

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Evaluation of drone vs. ground fungicide application methods in corn in northeast Indiana, 2024 (COR24-09.NEPAC).

A trial was established at the Northeast Purdue Agricultural Center (NEPAC) in Whitley County, IN. The experiment was a randomized complete block design with six replications. Plots were 30-ft wide and 360-ft long, consisted of twelve rows, and the two center rows used for evaluation. The previous crop was soybean. Standard practices for grain corn production in Indiana were followed. Corn hybrid 'P0574AM' was planted in 30-inch row spacing at a rate of 32,000 seeds/A on 30 May. Veltyma 3.34 S 7.0 fl oz/A was applied on 8 Aug at milk (R3) growth stage using two different applicators: a Case IH 2250 Patriot sprayer equipped with a 30-ft boom, fitted with eighteen AITTJ60-11008VP nozzles spaced 20-in. apart, at 8 mph and applied at 15 gal/A and 60 psi; and a DJI Agras T30 drone with spray pattern using sixteen XRTTeeJet 11001VS nozzles at 10-ft altitude at 15 mph to applied at 2 gal/A and at 8 mph to apply at 5 gal/A to apply at 2 gal/A. Disease rating was assessed on 19 Set at dent (R5) growth stage. Tar spot stromata severity and northern corn leaf blight (NCLB) were visually assessed as a percentage (0-100%) of symptomatic leaf area on five plants per plot at three locations in each plot and averaged before analysis. Percent canopy greenness was rated by visually assessing the percentage (0-100%) of canopy green on 2 Oct at dent (R5) growth stage. The trial was harvested on 24 Oct and yields were adjusted to 15.5% moisture. Data were averaged before analysis and subjected to mixed model analysis of variance in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were favorable for disease. Tar spot and northern corn leaf blight (NCLB) were the most prominent disease in the trial and reached low severity. The fungicide sprayed with the ground rig significantly reduced tar spot stromata severity over the drone at 5 GPA, but was not significant from the nontreated control (Table 49). There was no significant effect of application type for NCLB severity. There were no significant differences in treatments for percentage of canopy greenness. Veltyma sprayed with the ground rig resulted in significantly higher harvest moisture over nontreated control. There was no significant difference between application methods of fungicide and nontreated control for yield of corn.

Table 49. Effect of different application methods on foliar disease severity, canopy greenness, and yield of corn.

Application equipment and GPA[z]	Tar spot stromata[y] %	NCLB severity[y] %	Canopy green[x] %	Harvest moisture %	Yield[w] bu/A
Nontreated control	0.3 ab	0.6	40.8	18.3 b	185.5
DJI Agras T30 Drone at 2 GPA	0.4 ab	0.4	51.1	18.4 b	181.4
DJI Agras T30 Drone at 5 GPA	0.6 a	0.2	40.3	18.2 b	182.7
Ground-rig at 20 GPA	0.0 b	0.1	52.2	19.0 a	185.0
P-value[v]	*0.0223*	*0.2668*	*0.0699*	*0.0075*	*0.5980*

[z] Fungicide treatment was applied on 8 Aug at milk (R3) growth stage. All foliar treatments contained Veltyma 3.34 S at 7.0 fl oz/A and a non-ionic surfactant (Preference) at a rate of 0.25% v/v. A blue tracer dye was used at 0.25% v/v. GPA = gallons per acre.
[y] Foliar disease severity visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 19 Sep at dent (R5) growth stage. NCLB = northern corn leaf blight.
[x] Canopy greenness visually assessed percentage (0-100%) of canopy green on 2 Oct.
[w] Yields were adjusted to 15.5% moisture and harvested on 24 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

SOYBEAN (*Glycine max* 'P29A19E')
Septoria brown spot; *Septoria glycines*
Downy mildew; *Peronospora manshurica*
White mold; *Sclerotinia sclerotiorum*

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Evaluation of drone vs. ground fungicide application methods in soybean in northeast Indiana, 2024 (SOY24-06.NEPAC).

A trial was established at the Northeast Purdue Agricultural Center (NEPAC) in Whitley County, IN. The experiment was a randomized complete block design with six replications. Plots were 30-ft wide and 400-ft long, consisted of twenty-four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'P29A19E' was planted in 15-inch row spacing at a rate of 150,000 seeds/A on 24 May. Delaro Complete 3.82 SC 8.0 fl oz/A was applied on 23 Aug at beginning seed (R5) growth stage using two different applicators: a Case IH 2250 Patriot sprayer equipped with a 30-ft boom, fitted with eighteen AITTJ60-11008VP nozzles spaced 20-in. apart, at 8 mph and applied in 15 gal/A and 60 psi; and a DJI Agras T30 drone with spray pattern using sixteen XRTTeeJet 11001VS nozzles at 10-ft altitude at 15 mph to applied at 2 gal/A and at 8 mph to apply at 5 gal/A. Disease ratings were assessed on 5 Sep at full seed (R6) growth stage. Downy mildew (DM) was rated in the upper canopy and Septoria brown spot (SBS) was rated in the lower canopy. Disease severity of each disease was visually assessing the percentage (0-100%) of symptomatic in three locations each plot. White mold disease incidence assessed by counting the number of plants in each plot with symptoms. For white mold disease severity, each plant that is observed rated according to the following disease category: 0 = no disease; 1 = lateral branches with white mycelium and lesions; 2 = main stem with white mycelium and sclerotia present; 3 = entire plant wilted/plant death. The disease severity index (DSI) is calculated by multiplying the average number of plants in each severity category by the incidence: DSI = [sum (disease severity score × number of plants)]/[(maximum disease score) × (disease incidence)] × 100. Soybean plots were harvested on 9 Oct and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were moderately favorable for disease. White mold was the most prominent disease in the trial and reached moderate severity, sudden death syndrome was also noted in the trial. There was no significant effect between application type and nontreated control for Septoria brown spot (SBS), downy milder (DM) and white mold on 5 Sep (Table 50). There was no significant difference between treatments for yield of soybean.

Table 50. Effect of different application methods on disease severity and yield of soybean.

Treatment, application equipment and GPA[z]	SBS[y] %	DM[y] %	White mold DI[x]	White mold DSI[x]	Yield[w] bu/A
Nontreated control	1.5	0.7	2.6	25.7	48.6
DJI Agras T10 Drone at 2 GPA	1.1	0.6	1.3	12.8	49.6
DJI Agras T10 Drone at 5 GPA	1.1	0.7	1.7	15.7	50.3
Ground-rig at 20 GPA	1.0	0.7	1.6	15.7	48.9
P-value[v]	*0.2276*	*0.9180*	*0.4843*	*0.4775*	*0.0922*

[z] Fungicide applications were made on 23 Aug at beginning seed (R5) growth stage of Delaro Complete 3.82 SC at 8.0 fl oz/A plus a non-ionic surfactant (Preference) at a rate of 0.25% v/v. A blue tracer dye was used at 0.25% v/v. GPA= gallons per acre.
[y] Foliar disease incidence rated on scale of 0-100% of plants with disease symptoms on 5 Sep at full seed (R6) growth stage. SBS = Septoria brown spot in lower canopy; DM = downy mildew in upper canopy.
[x] White mold DI – disease incidence % per plot. White mold disease severity index (DSI) is calculated by multiplying the average number of plants in each severity category by the incidence: DSI = [sum (disease severity score x number of plants)]/[(maximum disease score) x (disease incidence)] x 100.
[w] Yields were adjusted to 13% moisture and harvested on 9 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

CORN (*Zea mays* 'P1136AM')
Tar spot; *Phyllachora maydis*
Gray leaf spot; *Cercospora zeae-maydis*
Southern rust; *Puccinia polysora*

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Evaluation of drone vs. ground fungicide application methods in corn in southeastern Indiana, 2024 (COR24-10.SEPAC).

A trial was established at the Southeast Purdue Agricultural Center (SEPAC) in Jennings County, IN. The experiment was a randomized complete block design with four replications. Plots were 30-ft wide and 590-ft long, consisted of twelve rows, and the two center rows used for evaluation. The previous crop was soybean. Standard practices for grain corn production in Indiana were followed. Corn hybrid 'P136AM' was planted in 30-inch row spacing at a rate of 32,000 seeds/A on 20 May. Veltyma 3.34 S 7.0 fl oz/A was applied on 9 Oct at milk (R3) growth stage using two different applicators: an Apache AS720 sprayer equipped with a 30-ft boom, fitted with six TTJ60-11005 nozzles spaced 15-in. apart at 12 mph and applied at 20 gal/A and 60 psi; and a DJI Agras T30 drone with spray pattern using sixteen XRTTeeJet 11001VS nozzles at 12-ft altitude at 11.6 mph to apply at 2 gal/A and at 4.7 mph to apply at 5 gal/A. Disease ratings were assessed on 17 Sep at dent (R5) growth stage. Tar spot stromata severity, gray leaf spot (GLS), and southern rust were visually assessed as a percentage (0-100%) of symptomatic leaf area at ear leaf on five plants per plot at three locations in each plot and averaged before analysis. Percent canopy green was rated by visually assessing the percentage (0-100%) of canopy green on 17 Sep at dent (R5) growth stage. The trial was harvested on 22 Oct and yields were adjusted to 15% moisture. Data were averaged before analysis and subjected to mixed model analysis of variance in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

In 2024, weather conditions were not favorable for disease. Tar spot and gray leaf spot (GLS) was the most prominent diseases in the trial and reached low severity. Veltyma sprayed with drone at 2 and 5 GPA and the ground rig significantly reduced tar spot and GLS severity over nontreated control, but there was no difference between application methods (Table 51). There were no significant differences between treatments for southern rust severity. There was no significant difference in treatments for percentage of canopy greenness, harvest moisture, and yield of corn.

Table 51. Effect of different application methods on foliar disease severity, canopy greenness, and yield of corn.

Application equipment and GPA[z]	Tar spot[y] %	GLS[y] %	Southern rust[y] %	Canopy[x] green %	Harvest moisture %	Yield[w] bu/A
Nontreated control	2.6 a	2.0 a	0.6	49.3	18.4	250.6
DJI Agras T30 Drone at 2 GPA	1.4 b	0.7 b	0.4	57.9	18.9	254.1
DJI Agras T30 Drone at 5 GPA	1.5 b	0.7 b	0.1	57.7	19.1	255.2
Ground-rig at 20 GPA	1.0 b	0.4 b	0.0	62.4	18.6	244.5
P-value[v]	*0.0003*	*0.0045*	*0.4456*	*0.2473*	*0.5071*	*0.3753*

[z] Fungicide treatment was applied on 9 Oct at milk (R3) growth stage using ground-rig and drone with 2 GPA and 5 GPA. All foliar treatments contained Veltyma 3.34 S at 7.0 fl oz/A and a non-ionic surfactant Maatyx 1 oz/A. A hot pink tracer dye was used at 0.25% v/v. GPA = gallons per acre.
[y] Foliar disease severity visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 17 Sep at dent (R5) growth stage. GLS = gray leaf spot.
[x] Canopy greenness visually assessed percentage (0-100%) of canopy green on 17 Sep.
[w] Yields were adjusted to 15.5% moisture and harvested on 22 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

SOYBEAN (*Glycine max* 'P34A98E')
Septoria brown spot; *Septoria glycines*
Downy mildew; *Peronospora manshurica*

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Evaluation of drone vs. ground fungicide application methods in soybean in southeastern Indiana, 2024 (SOY24-07.SEPAC).

A trial was established at the Southeast Purdue Agricultural Center (SEPAC) in Jennings County, IN. The experiment was a randomized complete block design with five replications. Plots were 30-ft wide and 836-ft long, consisted of twenty-four rows, and the two center rows used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar 'P34A98E' was drilled in 15-inch row spacing at a rate of 140,000 seeds/A on 29 Apr. Delaro Complete 3.82 SC 8 fl oz/A was applied on 24 Jul at beginning pod (R3) and 14 Aug at beginning seed (R5) growth stages using two different applicators. An Apache AS720 sprayer equipped with a 30-ft boom, fitted with six TTJ60-11005 nozzles spaced 15-in. apart at 12 mph and applied at 20 gal/A and 60 psi; and a DJI Agras T30 drone with spray pattern using sixteen XRTTeeJet 11001VS nozzles at 12-ft altitude at 11.6 mph to apply at 2 gal/A and at 4.7 mph to apply at 5 gal/A. Disease rating was assessed on 14 Sep at beginning maturity (R7) growth stage. Septoria brown spot (SBS) was rated in the lower canopy and downy mildew (DM) in the upper canopy. Severity of each disease was visually assessing the percentage (0-100%) of symptomatic in three locations each plot. Soybean plots were harvested on 25 Oct and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for disease. Septoria brown spot (SBS) was the most prominent disease in the trial and reached low severity. There was no significant difference between application type and nontreated control for Septoria brown spot (SBS) and downy mildew (DM) (Table 52). There was no significant difference between treatments and nontreated control for yield of soybean.

Table 52. Effect of different application type on disease severity and yield of soybean.

Application equipment, rate, and timing[z]	SBS[y] %	DM[y] %	Yield[x] bu/A
Nontreated control	1.1	0.3	58.8
DJI Agras T30 Drone 2 GPA at R3	0.9	0.1	64.9
DJI Agras T30 Drone 5 GPA at R3	0.4	0.1	61.1
Ground-rig 20 GPA at R3	0.6	0.1	58.1
DJI Agras T30 Drone 2 GPA at R5	0.7	0.2	55.3
DJI Agras T30 Drone 5 GPA at R5	0.3	0.2	64.5
Ground-rig 20 GPA at R5	0.7	0.2	57.2
P-value[w]	*0.4129*	*0.3246*	*0.5172*

[z] Fungicide treatment was applied on 24 Jul at beginning pod (R3) and 14 Aug at beginning seed (R5) growth stages using ground-rig and drone with 2 GPA and 5 GPA. All foliar treatments contained Delaro Complete 3.82 SC 8 fl oz/A, a non-ionic surfactant of Maatyx 1 oz/A. A hot pink tracer dye was used at 0.25% v/v. GPA = gallons per acre.
[y] Foliar disease incidence rated on scale of 0-100% of plants with disease symptoms on 3 Sep at beginning maturity (R7) growth stage. SBS = Septoria brown spot in lower canopy; DM = downy mildew in upper canopy.
[x] Yields were adjusted to 13% moisture and harvested on 25 Oct.
[w] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)

SOYBEAN (*Glycine max* '24E453N')
Septoria brown spot; *Septoria glycines*
Downy mildew; *Peronospora manshurica*

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Comparison of planting dates and seed treatments on soybean in southeastern Indiana. (SOY24-10.SEPAC).

A trial was established at Southeast Purdue Agricultural Center (SEPAC) in Butlerville, IN. The experiment was a randomized complete block design with three replications. Plots were 15-ft wide and 900+ ft long, consisted of six rows, and the two center rows were used for evaluation. The previous crop was corn. Standard practices for soybean production in Indiana were followed. Soybean cultivar '24E453N' were planted in 30-inch row spacing at a rate of 130,000 seeds/A. Treatments were a factorial arrangement of four planting dates by four seed treatments. Soybeans were planted on 22 Apr (planting date 1), 14 May (planting date 2), 30 May (planting date 3) and 12 Jun (planting date 4). Disease ratings were assessed on 30 Aug at full seed/beginning maturity/full maturity (R6/R7/R8) growth stage. Septoria brown spot (SBS) and downy mildew (DM) were rated for disease severity by visually assessing the percentage symptomatic leaf area in the upper and lower canopies. Ten roots were sampled for outer rows of each plot and rated for root rot severity on a scale of 0-100% and averaged before analysis. Each plot was harvested on 12 Oct and yields were adjusted to 13% moisture. All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

In 2024, weather conditions were not favorable for diseases. Septoria brown spot (SBS) and downy mildew (DM) were the most prominent diseases in the trial and reached low severity. SBS severity was significantly reduced on the last planting (12 Jun) compared to earlier planting dates (22 Apr, 14 May and 30 May) (Table 53). No significant differences were observed between seed treatments for SBS severity. Planting on 22 Apr significantly reduced downy mildew (DM) severity compared to 14 May, 30 May and 12 Jun. The nontreated control had significantly lower DM severity compared to CruiserMaxx APX with and without Thiamethoxam and Thiamethoxam only. Planting on 30 May and 12 June significantly reduced root rot severity compared to 22 Apr and 14 May. Moisture was significantly higher on 14 May compared to 22 Apr, 30 May and 12 Jun. There were no significant differences between seed treatments on root rot and moisture. Soybean yield was significantly reduced planted on 12 Jun compared to 14 May which resulted on the highest yield. The seed treatments CruiserMaxx APX with and without Thiamethoxam had the highest yields compared to the nontreated control.

Table 53. Effect of planting date and seed treatment on foliar diseases, root rot, and yield of soybean.

Planting dates and seed treatments[z]	SBS[y] %	DM[y] %	Root rot[x] %	Harvest moisture %	Yield[w] Bu/A
Planting date 1 (22 Apr)	6.1 a	2.5 c	9.6 a	12.0 b	67.5 b
Planting date 2 (14 May)	6.1 a	2.9 bc	7.5 b	12.3 a	71.8 a
Planting date 3 (30 May)	2.0 b	3.4 ab	3.6 c	12.1 b	69.7 ab
Planting date 4 (12 Jun)	1.0 c	3.6 a	1.8 c	12.0 b	57.0 c
Nontreated control	3.6	2.4 b	6.2	12.1	63.9 b
CruiserMaxx APX + Thiamethoxam	3.9	3.3 a	5.4	12.2	67.3 a
Thiamethoxam	4.0	3.4 a	5.5	12.1	66.6 ab
CruiserMaxx APX without Thiamethoxam	3.6	3.3 a	5.6	12.1	68.2 a
P-value planting date[v]	*0.0001*	*0.0090*	*0.0001*	*0.0014*	*0.0001*
P-value seed treatment	*0.1589*	*0.0093*	*0.8066*	*0.5017*	*0.0232*
*P-value planting date*seed treatment*	*0.2694*	*0.1524*	*0.0968*	*0.2967*	*0.0110*

[z] Seed treatments applied prior to planting at 10 g AI/100 kg seed.
[y] Foliar disease severity rated on scale of 0-100% of symptomatic leaf area in the upper and lower canopies on 30 Aug at full seed/beginning maturity/full maturity (R6/R7/R8) growth stage. SBS=Septoria brown spot; DM=downy mildew.
[x] Root rot visually assessed as a percentage (0-100%) of dark discoloration on 10 roots per plot.
[w] Yields were adjusted to 13% moisture and harvest on 12 Oct.
[v] All data were analyzed in SAS 9.4 (SAS Institute, Cary, NC). A generalized linear mixed model analysis of variance was performed using PROC GLIMMIX. Values are least squares means and values with different letters are significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).

APPENDIX –WEATHER DATA

Table 54. Average monthly weather conditions at the Purdue Agronomy Center for Research and Education (ACRE), Pinney Purdue Agricultural Center (PPAC), Southwest Purdue Agricultural Center (SWPAC), Davis Purdue Agricultural Center (DPAC), Northeast Purdue Agricultural Center (NEPAC), and Southeast Purdue Agricultural Center (SEPAC) in Indiana, 2024[z].

Months	ACRE			PPAC			SWPAC		
	Ave Temp.[y] °F	Relative humidity[x] %	Total precipit.[w] (in)	Ave Temp.[y] °F	Relative humidity[x] %	Total precipit.[w] (in)	Ave Temp.[y] °F	Relative humidity[x] %	Total precipit.[w] (in)
January	27.3	84.1	4.69	24.9	85.1	3.33	30.4	78.7	6.01
February	38.6	72.7	0.72	35.9	74.0	0.66	43.5	63.0	0.53
March	46.9	64.4	2.35	41.8	68.9	5.13	50.8	60.5	1.88
April	54.1	69.1	5.85	50.7	68.8	4.65	59.0	66.1	8.08
May	67.3	66.6	2.14	63.0	68.4	2.86	69.5	70.9	6.12
June	73.7	64.9	2.80	71.3	66.3	2.34	76.0	64.0	2.35
July	72.7	76.5	5.01	70.2	77.7	6.16	76.1	72.3	5.62
August	71.8	76.0	4.15	69.7	76.8	2.95	75.4	71.1	2.12
September	67.0	71.0	1.42	64.9	71.1	2.39	70.7	68.2	4.98
October	57.3	61.0	0.19	55.0	63.7	9.64	60.8	60.3	0.55
November	46.2	78.6	2.74	43.8	78.1	3.37	50.0	73.6	4.26
December	33.8	79.1	3.68	31.3	76.3	2.96	38.6	74.6	5.68
Annual	***54.7***	***72.0***	***35.74***	***51.9***	***72.9***	***46.44***	***58.4***	***68.6***	***48.18***

Months	DPAC			NEPAC			SEPAC		
	Ave Temp.[y] °F	Relative humidity[x] %	Total precipit.[w] (in)	Ave Temp.[y] °F	Relative humidity[x] %	Total precipit.[w] (in)	Ave Temp.[y] °F	Relative humidity[x] %	Total precipit.[w] (in)
January	27.1	83.0	3.57	26.1	85.1	4.46	30.5	79.9	7.67
February	37.3	72.0	0.70	36.5	73.1	0.90	42.3	64.6	1.30
March	45.0	67.0	3.85	43.6	67.8	3.52	48.7	63.7	3.70
April	54.0	69.0	6.29	52.3	67.4	7.96	57.5	67.4	4.95
May	66.5	68.0	1.78	65.3	67.4	3.61	67.6	74.3	4.42
June	72.7	65.0	2.43	72.8	63.5	3.06	73.4	67.7	1.23
July	71.9	75.0	2.22	72.2	75.2	4.10	74.5	74.6	5.57
August	71.1	75.0	3.83	71.3	75.1	1.67	73.1	75.1	4.82
September	66.3	70.0	2.20	67.0	70.4	1.43	68.4	72.5	4.71
October	56.0	64.0	0.20	56.4	61.6	0.42	58.0	67.0	0.66
November	45.6	78.0	3.41	45.1	79.2	1.89	49.0	76.2	5.40
December	33.7	79.0	4.27	32.8	79.7	4.46	37.9	75.5	5.05
Annual	***53.9***	***72.1***	***34.75***	***53.5***	***72.1***	***37.48***	***56.7***	***71.5***	***49.48***

[z] Data courtesy of Indiana State Climate Office. Beth Hall, Jonathan Weaver and Austin Pearson. https://ag.purdue.edu/indiana-state-climate/. Taken from Purdue Mesonet stations.
[y] Average temperature for each month.
[x] Average relative humanity for each month.
[w] Total precipitation for each month.