WHEAT (*Triticum aestivum* 'Kaskaskia and Harpoon')
Fusarium head blight; *Fusarium graminearum*

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Evaluation of foliar fungicides and organic varieties for scab management in central Indiana, 2021 (WHT21-01.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. Organic wheat varieties 'Kaskaskia and Harpoon' were planted in 7.5-inch row spacing using a drill on 14 Oct, 2020. 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, at 3.0 mph. Fungicides were applied on 22 May and 23 May, 2021 at the Feekes growth stage 10.5.1. All plots were inoculated with a mixture of isolates of *Fusarium graminearum* endemic to Indiana on 23 May and 24 May, 2021 with a spore suspension (50,000 spores/ml) applied at 300 ml/plot. Disease ratings were assessed on 11 Jun. 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. The eight center rows of each plot were harvested with a Kincaid plot combine on 7 Jul and yields were adjusted to 13.5% moisture. Data were subjected to mixed model analysis of variance (SAS 9.4, 2019) and means were compared using Fisher's Least Significant Difference (LSD, α=0.05).

In 2021, weather conditions were not favorable for Fusarium head blight (FHB). No differences between treatments for FHB incidence, severity and Index and non-treated control on 11 Jun (Table 1). The % of Fusarium damaged kernals (FDK) was lowest in the Kaskaskia variety and when treated with Prosaro and Actinovate. The concentration of deoxynivalenol (DON) was lowest in the variety Kaskaskia. An application of Pacesetter increased DON over non-treated. There was no difference in treatment for wheat yield.

Table 1. Effect of variety and fungicide on Fusarium head blight and foliar diseases in organic wheat.

Variety, treatment and rate/A[z]	FHB % incidence[y] 11 Jun	FHB % severity[x] 11 Jun	FHB Index[w] 11 Jun	FDK %[v] 21 Sep	DON ppm[u] 21 Oct	Yield[t] bu/A 7 Jul
Variety						
Kaskaskia	17.6[s]	3.8	0.6	14.5 b	0.067 b[v]	41.4
Harpoon	20.3	4.5	0.9	20.8 a	0.341 a	46.4
Fungicide programs						
Non-treated control	21.5	6.3	1.4	20.7 a	0.150 b	41.7
Prosaro 421 SC 8.2 fl oz	23.3	2.5	0.6	14.7 c	0.243 ab	45.2
ChampION 50 WP 1.5 lb	17.1	1.9	0.4	18.6 ab	0.200 ab	46.6
Pacesetter WS 13.0 fl oz	17.7	3.3	0.6	18.2 ab	0.367 a	43.2
Sonata 1.0 qt	14.9	7.3	0.8	18.3 ab	0.120 b	44.0
Actinovate AG 12.0 fl oz	20.2	3.5	0.8	16.1 bc	0.150 b	42.9
p-value *variety*[u]	*0.2606*	*0.6373*	*0.1798*	*0.0001*	*0.0001*	*0.1880*
p-value *fungicide*	*0.2389*	*0.3333*	*0.1916*	*0.0223*	*0.0957*	*0.9796*
p-value *variety*fungicide*	*0.1083*	*0.8776*	*0.4629*	*0.7277*	*0.1323*	*0.8851*

[z] Fungicides were applied on 22 May and 23 May 2021 at the Feekes growth stage 10.5.1. All plots were inoculated with a mixture of isolates of *Fusarium graminearum* endemic to Indiana on 23 May and 24 May with a spore suspension (50,000 spores/ml) applied at 300 ml/plot on 23 May and 24 May.
[y] FHB incidence was measured as the number of infected heads out of 60 plants in each plot and calculated as a percentage.
[x] FHB severity was rated by visually assessing the percentage of the infected head. FHB = Fusarium head blight.
[w] FHB index was calculated as: (% FHB incidence multiplied by average FHB severity)/100 per plot.
[v] FDK = percentage of Fusarium damaged kernels.
[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 7 Jul.
[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 least squares means test (α=0.05).

CORN (*Zea mays* 'ALSEED O.84-95UP')
Tar spot; *Phyllachora maydis*
Northern corn leaf blight; *Setosphaeria turica*

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Fungicide evaluation for tar spot in organic corn in northwestern Indiana, 2021 (COR21-05.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 organic grain corn production in Indiana were followed. Corn organic hybrid ALSEED O.84-95UP was planted in 30-inch row spacing at a rate of 34,000 seeds/A on 25 May. The field was overhead irrigated weekly at 1 in. unless weekly rainfall was 1 in. or higher to encourage disease. 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 at 3.6 mph. Fungicide treatments were applied on 2 Aug at R1 (silk) growth stage. Disease ratings were assessed on 16 Sep at R5 (dent) growth stage. Tar spot was rated by visually assessing the percentage of stroma (0-100%) and percentage of symptomatic tissues (chlorosis and necrosis) (0-100%) per leaf on five plants in each plot at the ear leaf. Northern corn leaf blight (NCLB) was rated for disease severity by visually assessing the percentage of symptomatic leaf area in the mid canopy. Values for the five leaves were averaged before analysis. Percent canopy green was rated by visually assessing the percentage (0-100%) of whole plot for crop canopy that remained green at R5 (dent) growth stage. The two center rows of each plot were harvested on 3 Nov and yields were adjusted to 15.5% moisture. Data were subjected to mixed model analysis of variance (SAS 9.4, 2019) and means were compared using Fisher's Least Significant Difference (LSD, α=0.05).

In 2021, weather conditions were favorable for disease. Tar spot was the most prominent disease in the trial and reached high severity. All fungicide treatments reduced tar spot stroma severity on ear leaf over the non-treated control (Table 2). Headline Amp significantly reduced the percentage of symptomatic tissues on ear leaf. There was no significant difference between treatments for severity of NCLB on ear leaf. Headline Amp had a highest percent of green plots and corn yield. There were no significant differences between treatments for harvest moisture and test weight.

Table 2. Effect of fungicide on foliar disease severity at R5 (dent) growth stage, stay green and corn yield.

Treatment and rate/A[z]	Tar spot % severity[y] 16 Sep	Tar spot % chlor/nec[x] 16 Sep	NCLB % severity[w] 16 Sep	Canopy % green[v] 16 Sep	Harvest moisture %	Test weight lb/bu	Yield[u] bu/A
Non-treated control	25.8 a	86.0 a	0.5 a	23.8 b	16.8	55.9	148.2 b
Headline AMP 1.68 SE 10.0 fl oz	10.0 d	56.3 b	1.2 a	40.0 a	17.0	56.4	162.6 a
Serifel WP 16.0 fl oz	18.3 bc	86.8 a	0.5 a	22.5 b	16.8	56.2	148.3 b
Actinovate AG 12.0 ox	20.3 b	76.3 ab	0.0 a	25.0 b	16.7	55.6	160.7 ab
Badge X2 SC 1.8 lb	14.8 cd	74.3 ab	1.9 a	33.8 b	17.1	56.2	149.9 b
OxiDate 5.0 128.0 fl oz	20.3 b	78.3 ab	0.5 a	23.8 b	16.9	56.3	159.4 ab
p-value[t]	*0.0001*	*0.0001*	*0.6753*	*0.0001*	*0.4366*	*0.2614*	*0.0001*

[z] Fungicide treatments were applied at on 2 Aug at R1 (silk) growth stage.
[y] Tar spot stroma visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 16 Sep.
[x] Tar spot chlorosis and necrosis symptoms visually assessed percentage (0-100%) of leaf area on five plants in each plot at the ear leaf on 16 Sep.
[w] NCLB was rated for disease severity by visually assessing the percentage of symptomatic leaf area in the mid canopy on 16 Sep. NCLB = northern corn leaf blight.
[v] Canopy greenness visually assessed percentage (0-100%) of crop canopy green on 16 Sep.
[u] Yields were adjusted to 15.5% moisture and harvested on 3 Nov.
[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).

SOYBEAN (*Glycine max* 'Dane and MN1410')
Frogeye leaf spot; *Cercospora sojina*
White mold; *Sclerotinia sclerotiorum*

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Fungicide comparison for white mold in organic soybean in northwestern Indiana, 2021 (SOY21-09).

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 6.7-ft wide and 30-ft long, consisted of four rows, and the two center rows used for evaluation. The previous crop was sunflower. Cereal rye was planted on 18 Sep 2020 at a rate of 150 lbs/A. On 24 May and 25 May the cover crop was terminated using either tillage or roller-crimping. Standard practices for soybean organic production in Indiana were followed. Organic soybean varieties 'Dane and MN1410' were planted in 20-inch row spacing at a rate of 8 seeds/ft on 25 May. Inoculum of *S. sclerotiorum* was applied within the seedbed at 1.25 g/ft at planting and 60 sclerotia per plot were spread between the middle two rows after tillage and before roller-crimping. The field was overhead irrigated weekly at 1 in. unless weekly rainfall was 1 in. or higher to encourage disease. All fungicides applications were applied at 15 gal/A and 40 psi using a CO_2 backpack sprayer equipped with a 10-ft boom, fitted with four or six TJ-VS 8002 nozzles spaced 20 or 30-in. apart at 3 mph. Fungicides were applied on 19 Jul at R2 (full bloom) growth stage. Disease ratings were assessed on 26 Aug at R6 (full seed). Frogeye leaf spot (FLS) severity was rated by visually assessing the percentage (0-100%) of symptomatic leaf area in the upper canopy. The two center rows of each plot were harvested on 28 Sep and yields were adjusted to 13% moisture. Data were subjected to mixed model analysis of variance (SAS 9.4, 2019) and means were compared using Fisher's Least Significant Difference (LSD, α=0.05).

In 2021, very little disease developed in plots. White mold was not observed in the plots. Frogeye leaf spot was the most prominent disease in the trial, but only reached low severity. Main effects of variety, cover crop termination, and fungicide treatments are presented since no significant interactions between tillage, variety, fungicide, except for tillage by variety in yield (Table 3). Frogeye leaf spot severity was significantly reduced in the variety Dane when compared to MN1410. Roller-crimped rye increased yield of Dane as compared to full tillage, but there were no differences in yield of MN1410 with cover crop termination treatment.

Table 3. Effect of fungicide on foliar disease severity at R6 (full seed) growth stage, and corn yield.

Treatment[z]	**Frogeye leaf spot % severity[y] 26 Aug**	**Harvest moisture % 28 Sep**	**Test weight lb/bu 28 Sep**	**Yield[x] bu/A 28 Sep**	
Cover crop termination				**Dane**	**MN1410**
Full tillage	0.3	12.8	50.7	29.1 b	53.2
Roller-crimped rye	0.4	12.6	54.9	52.0 a	65.9
Variety				*p=0.0158*	*p=0.0566*
Dane	0.1 b	12.4 b	50.7 b	-	
MN1410	0.6 a	13.1 a	54.9 a	-	
Fungicide programs and rate/A					
Non-treated control	0.5	12.5	52.1	52.0	
Endura 70 WDG 8.0 fl oz	0.4	12.5	52.3	49.2	
Double Nickel 55 DWG 2 qt	0.2	12.9	54.3	51.3	
Serifel WP 16 fl oz	0.7	13.0	52.9	50.3	
Actinovate AG 12 oz	0.3	12.4	52.1	49.0	
BotryStop 2 lb	0.2	13.1	53.3	48.8	
p-value *till*[w]	*0.6481*	*0.3946*	*0.0860*	*0.0252*	
p-value *variety*	*0.0003*	*0.0001*	*0.0001*	*0.0001*	
p-value *fungicide*	*0.1618*	*0.0162*	*0.4855*	*0.9379*	
p-value *till*variety*	*0.3741*	*0.5705*	*0.0001*	*0.0188*	
p-value *till*fungicide*	*0.6915*	*0.0485*	*0.4606*	*0.3631*	
p-value *variety*fungicide*	*0.0612*	*0.2259*	*0.2945*	*0.8294*	
p-value *till*variety*fungicide*	*0.7392*	*0.1507*	*0.2673*	*0.5359*	

[z] Fungicide treatments applied on 19 Jul at R2 (full bloom) growth stage. All plots were inoculated with *S. sclerotiorum* at 1.25 g/ft within the seedbed at planting and 60 sclerotia per plot were spread between the middle two rows before roller-crimped and after tillage.
[y] Frogeye leaf spot severity was rated by visually assessing the percentage (0-100%) of symptomatic tissue (lesions) per leaf in the upper canopy on ten plants per plot on 26 Aug. Values for the 10 plants were averaged before analysis.
[x] Yields were adjusted to 13% moisture and harvested on 28 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 least.