2022

Wisconsin Field Crops Pathology Fungicide Test and Disease Management Summary

Brian Mueller, Researcher II,
UW-Madison, Plant Pathology

Damon Smith, Professor and Extension Specialist, UW-Madison, Plant Pathology

Extension
UNIVERSITY OF WISCONSIN–MADISON

NPM

BADGER Crop Doc

Contents

Acknowledgements

This report is a concise summary of pesticide related research trials conducted in 2022 under the direction of the Wisconsin Field Crops Pathology program in the Department of Plant Pathology at the University of Wisconsin-Madison. We thank Annie Pohlen, Riley Breunig, and Sophie Lusty for assisting in conducting these trials. We would also like to thank Scott Chapman, Carol Groves, Camila Nicolli, Rodrigo Pedrozo, Maxwell Chibuogwu, Kelly Debbink, Wade Webster, John Gaska, Adam Roth, and Shawn Conley for technical support.

The authors would also like to thank the following for their support in 2022:

ADAMA
AgBiome
BASF
Bayer CropScience
FMC
Gowan
Joyn Bio
Midwest Food Processors Association
North Central Soybean Research Program
Oro Agri
Summit Agro
Syngenta
Valent
Vive Crop Protection
Wisconsin Corn Promotion Board
Wisconsin Soybean Marketing Board

Disclaimer

Mention of specific products in this publication are for your convenience and do not represent an endorsement or criticism. This by no means is a complete test of all products available. You are responsible for using pesticides according to the manufacturers current label. Some products listed in this report may not actually have an approved Wisconsin pesticide label. Be sure to check with your local extension office or agricultural chemical supplier to be sure the product you would like to use has an approved label. Follow all label instructions when using any pesticide. Remember the label is the law!

Trial 1: Evaluation of foliar fungicides for control of tar spot of dent corn in Arlington, Wisconsin, 2022- Experiment #1

DENT CORN (*Zea mays* 'CP3899VT2P/RIB')
Tar spot; *Phyllachora maydis*

The trial was established at the Arlington Agricultural Research Station located in Arlington, WI. The corn hybrid 'CP3899VT2P/RIB' was chosen for this trial. Corn preceded this crop. Corn was planted (9 May) using a no-till program in a field consisting of a Plano silt loam soil (2 to 6% slopes). The experimental design was a randomized complete block with four replicates. Plots consisted of four 30-in spaced rows, 20 ft long and 10 ft wide with 5-ft alleys between plots. Standard corn production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of a non-treated check and 14 fungicide treatments. Fungicide treatments applied at R1 and R3 were mixed with the non-ionic surfactant, Induce 90SL, at 0.125% v/v. Foliar fungicides were applied using a CO_2-pressurized backpack sprayer equipped with TeeJet XR 8002-VS flat fan nozzles on a 10-ft boom calibrated to deliver 20 GPA at 40 psi. Treatments were applied at growth stages V7 on 1 Jul, V12 on 21 Jul, R1 (silk) on 26 Jul, or R3 (milk) on 12 Aug. One treatment was applied at V8 on 7 Jul and V12 with guidance of the Tarspotter smartphone application. Natural sources of pathogen inoculum were relied upon for disease. Tar spot severity was rated on 22 Sep. Tar spot was visually assessed by estimating average severity (% stroma on ear leaf) per plot with the aid of standardized area diagrams. Yield (corrected to 15.5% moisture) was determined by harvesting the center two rows of each plot using an Almaco SPC40 small-plot combine equipped with a HarvestMaster HM800 Classic grain gauge. Data were analyzed using a mixed model analysis of variance and means were separated using Fisher's Least Significant Difference (LSD; α=0.05).

Tar spot did not increase until late in the season leading to lower levels of tar spot compared to 2021. Veltyma applied at R1 + R3 had significantly higher canopy greening among all treatments (Table 1). Applications of Delaro Complete (10.0 fl oz) at R1, Delaro Complete (8.0 fl oz) at R1 + R3, Miravis Neo at R1 + R3, Delaro (4.0 fl oz) at V7 followed by Delaro (8.0 fl oz) at R3, and Delaro (10.0 fl oz) at R1 resulted in significantly higher canopy greening than the non-treated control. Veltyma applied at R1 + R3 significantly reduced tar spot severity compared to all other treatments. No significant differences were observed for yield among all treatments. Phytotoxicity was not observed for any treatment.

Table 1. Canopy greening, tar spot severity, and yield for dent corn treated with fungicide or not treated with fungicide in Wisconsin in 2022.

Treatment and rate/A (growth stage at application)	**Canopy Greening** (%) [z,y]	**Tar Spot Severity** (%) [x,y]	**Yield** (bu/A)
Non-treated check	2.5 e	1.2 cd	199.1
Delaro Complete 3.83SC 8.0 fl oz (V12)	2.5 e	1.1 d	198.2
Delaro Complete 3.83SC 8.0 fl oz (V12) Delaro Complete 3.83SC 8.0 fl oz (R1)[w]	7.5 c-e	2.0 a-d	207.9
Delaro Complete 3.83SC 8.0 fl oz (V12) Delaro Complete 3.83SC 8.0 fl oz (R3)[w]	13.8 b-e	1.1 d	182.5
Veltyma 3.34SC 7.0 fl oz (V12)	8.8 c-e	2.0 a-d	207.5
Veltyma 3.34SC 7.0 fl oz (V12) Veltyma 3.34SC 7.0 fl oz (R1)[w]	22.5 b-e	1.8 a-d	216.5
Delaro Complete 3.83SC 8.0 fl oz (R1)[w]	11.3 b-e	2.5 a-c	209.6
Delaro Complete 3.83SC 10.0 fl oz (R1)[w]	15.0 b-d	3.9 a	213.8
Delaro Complete 3.83SC 8.0 fl oz (R1)[w] Delaro Complete 3.83SC 8.0 fl oz (R3)[w]	18.8 bc	1.1 d	218.1
Veltyma 3.34SC 7.0 fl oz (R1)[w] Veltyma 3.34SC 7.0 fl oz (R3)[w]	35.0 a	0.3 e	169.4

continued on next page

Treatment and rate/A (growth stage at application)	**Canopy Greening** (%)[z,y]	**Tar Spot Severity** (%)[x,y]	**Yield** (bu/A)
Miravis Neo 2.5SE 13.7 fl oz (R1)w Miravis Neo 2.5SE 13.7 fl oz (R3)w	15.0 b-d	1.7 b-d	215.3
Delaro 325SC 4.0 fl oz (V7)w Delaro 325SC 8.0 fl oz (R3)w	22.5 b	1.3 cd	212.5
Delaro 325SC 10.0 fl oz (R1)w	17.5 bc	2.1 a-d	208.8
Delaro 325SC 8.0 fl oz (R1)[w]	11.3 b-e	3.3 ab	205.8
Delaro Complete 3.83SC 8.0 fl oz (Model)[v]	5.0 de	1.7 b-d	185.0
P-value	<0.0001	<0.0001	ns[u]

[z]Greening effect determined by rating the percentage green foliage still present in each plot at early black layer.
[y]Means followed by the same letter are not significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).
[x]Tar spot severity was visually assessed as the average % ear leaf symptomatic per plot with the aid of a standard area diagram; means for each plot were used in the analysis.
[w]Induce 90% SL (Non-ionic surfactant) at 0.125% v/v was added to fungicide treatments.
[v]Model application sprays were determined using the Tarspotter smartphone application which recommended applications at V8 and again at V12.
[u]ns = not significant (α=0.05).

Trial 2: Evaluation of foliar fungicides for control of tar spot of dent corn in Arlington, Wisconsin, 2022- Experiment #2

DENT CORN (*Zea mays* 'CP3899VT2P/RIB')
Tar spot; *Phyllachora maydis*

The trial was established at the Arlington Agricultural Research Station located in Arlington, WI. The corn hybrid 'CP3899VT2P/RIB' was chosen for this trial. Corn preceded this crop. Corn was planted (9 May) using a no-till program in a field consisting of a Plano silt loam soil (2 to 6% slopes). The experimental design was a randomized complete block with four replicates. Plots consisted of four 30-in spaced rows, 20 ft long and 10 ft wide with 5-ft alleys between plots. Standard corn production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of a non-treated check and eight fungicide treatments. Fungicide treatments applied at R1 were mixed with the non-ionic surfactant, Induce 90SL, at 0.25% v/v. Foliar fungicides were applied using a CO_2-pressurized backpack sprayer equipped with TeeJet XR 8002-VS flat fan nozzles on a 10-ft boom calibrated to deliver 20 GPA at 40 psi. Treatments were applied at V12 on 21 Jul and R1 (silk) on 26 Jul. Natural sources of pathogen inoculum were relied upon for disease. Tar spot severity was rated on 22 Sep. Tar spot was visually assessed by estimating average severity (% stroma on ear leaf) per plot with the aid of standardized area diagrams. Yield (corrected to 15.5% moisture) was determined by harvesting the center two rows of each plot using an Almaco SPC40 small-plot combine equipped with a HarvestMaster HM800 Classic grain gauge. Data were analyzed using a mixed model analysis of variance and means were separated using Fisher's Least Significant Difference (LSD; α=0.05).

Tar spot severity didn't increase until late in the season leading to low to moderate levels of tar spot, overall. Both rates of Veltyma applied at R1 resulted in significantly higher canopy greening compared to all other treatments (Table 2). Veltyma applied at R1 with the 10.0 fl oz rate, Experimental 1 at R1 and Experimental 2 at R1 had significantly lower tar spot severity compared to the non-treated check. No significant differences were observed for yield among all treatments. Phytotoxicity was not observed for any treatment.

Table 2. Canopy greening, tar spot severity, and yield for dent corn treated with fungicide or not treated with fungicide in Wisconsin in 2022.

Treatment and rate/A (growth stage at application)	**Canopy Greening** (%)[z,y]	**Tar Spot Severity** [x,y]	**Yield** (bu/A)[y]
Non-treated check	5.0 c	6.2 ab	206.1
Veltyma 3.34SC 7.0 fl oz (V12)	11.3 c	4.3 bc	200.9
Veltyma 3.34SC 10.0 fl oz (V12)	22.5 b	9.1 a	218.7
Headline AMP 1.68SC 10.0 fl oz (R1)[w]	13.8 bc	4.1 bc	227.2
Headline AMP 1.68SC 14.0 fl oz (R1)[w]	15.0 bc	3.4 bc	215.1
Veltyma 3.34SC 7.0 fl oz (R1)[w]	37.5 a	4.0 bc	233.2
Veltyma 3.34SC 10.0 fl oz (R1)[w]	38.8 a	3.2 c	230.8
Experimental 1 4.5 fl oz (R1)[w]	13.8 bc	2.5 c	197.2
Experimental 2 6.5 fl oz (R1)[w]	13.8 bc	2.4 c	214.1
P-value	<0.0001	<0.0001	ns[v]

[z]Greening effect determined by rating the percentage green foliage still present in each plot at early black layer.
[y]Means followed by the same letter are not significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).
[x]Tar spot severity was visually assessed as the average % ear leaf symptomatic per plot with the aid of a standard area diagram; means for each plot were used in the analysis.
[w]Induce 90% SL (Non-ionic surfactant) at 0.25% v/v was added to fungicide treatments.
[v]ns = not significant (α=0.05).

Trial 3: Evaluation of foliar fungicides for control of tar spot of dent corn in Arlington, Wisconsin, 2022- Experiment #3

DENT CORN (*Zea mays* 'CP3899VT2P/RIB')
Tar spot; *Phyllachora maydis*

The trial was established at the Arlington Agricultural Research Station located in Arlington, WI. The corn hybrid 'CP3899VT2P/RIB' was chosen for this trial. Corn preceded this crop. Corn was planted (9 May) using a no-till program in a field consisting of a Plano silt loam soil (2 to 6% slopes). The experimental design was a randomized complete block with four replicates. Plots consisted of four 30-in spaced rows, 20 ft long and 10 ft wide with 5-ft alleys between plots. Standard corn production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of a non-treated check and 11 fungicide treatments. Some treatments were mixed with the non-ionic surfactant, Induce 90SL, at 0.25% v/v. Foliar fungicides were applied using a CO_2-pressurized backpack sprayer equipped with TeeJet XR 8002-VS flat fan nozzles on a 10-ft boom calibrated to deliver 20 GPA at 40 psi. Treatments were applied at growth stages V12 on 21 Jul and R1 (silk) on 26 Jul. One treatment was applied at V8 on 7 Jul and V12 with guidance of the Tarspotter smartphone application. Natural sources of pathogen inoculum were relied upon for disease. Tar spot severity was rated on 22 Sep. Tar spot was visually assessed by estimating average severity (% stroma on ear leaf) per plot with the aid of standardized area diagrams. Yield (corrected to 15.5% moisture) was determined by harvesting the center two rows of each plot using an Almaco SPC40 small-plot combine equipped with a HarvestMaster HM800 Classic grain gauge. Data were analyzed using a mixed model analysis of variance and means were separated using Fisher's Least Significant Difference (LSD; α=0.05).

Due to late season increase of tar spot, this trial had lower levels of tar spot compared to 2021. Experimental 3 applied at R3, Topguard EQ at R1 and Veltyma at R1 resulted in significantly higher canopy greening compared to the non-treated control (Table 3). There were no significant differences in tar spot severity among all treatments. No treatments resulted in significantly higher yields when compared to the non-treated control. However, Experimental 2 applied at R1 and Regev at R1 had significantly lower yields than Experimental 3 at R1, Topguard EQ at R1 and Veltyma applied at R1. Phytotoxicity was not observed for any treatment.

Table 3. Canopy greening, tar spot severity, and yield for dent corn treated with fungicide or not treated with fungicide in Wisconsin in 2022.

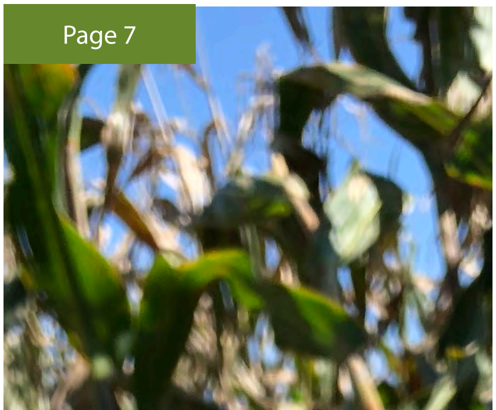
Treatment and rate/A (growth stage at application)	Canopy Greening (%)[z,y]	Tar Spot Severity (%)[x]	Yield (bu/A)[y]
Non-treated check	16.3 de	5.2	218.2 bc
Experimental 1 (V12) Experimental 1 (R1)[w]	25.0 a-e	3.9	216.8 bc
Experimental 2 (R1)[w]	27.5 a-d	5.1	209.2 c
Experimental 3 (R1)[w]	33.8 ab	3.7	225.6 ab
Lucento 4.17SC 5.0 fl oz (R1)	22.5 b-e	4.3	218.2 bc
Experimental 4	21.3 c-e	2.9	216.8 bc
Topguard EQ 4.29SC 5.0 fl oz (R1)	28.8 a-c	5.1	230.8 ab
Delaro Complete 3.83SC 8.0 fl oz (R1)	20.0 c-e	3.1	217.1 bc
Regev 8.5 fl oz (R1)	15.0 e	4.3	208.1 c
TACT 29.8 fl oz (R1)	17.5 c-e	3.9	215.5 bc
Veltyma 3.34SC 7.0 fl oz (R1)	35.0 a	2.9	234.6 ab
Delaro Complete 3.83SC 8.0 fl oz (Model)[v]	17.5 c-e	3.5	218.8 bc
P-value	<0.01	ns[u]	<0.05

[z]Greening effect determined by rating the percentage green foliage still present in each plot at early black layer.
[y]Means followed by the same letter are not significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).
[x]Tar spot severity was visually assessed as the average % ear leaf symptomatic per plot with the aid of a standard area diagram; means for each plot were used in the analysis.
[w]Induce 90% SL (Non-ionic surfactant) at 0.25% v/v was added to fungicide treatments.
[v]Model application sprays were determined using the Tarspotter smartphone application which recommended applications at V8 and again at V12.
[u]ns = not significant (α=0.05).

Trial 4: Evaluation of foliar fungicide application timing for control of tar spot and ear rot on silage corn in Arlington, Wisconsin, 2022- Experiment #1

SILAGE CORN (*Zea mays* 'B10B77SX')
Tar spot; *Phyllachora maydis*
Ear rot; *Gibberella zeae*

The trial was established at the Arlington Agricultural Research Station located in Arlington, WI. The corn hybrid 'B10B77SX' (110-day relative maturity brown midrib hybrid) was chosen for this trial. Wheat preceded this crop. Corn was planted on 12 May in a field consisting of Joy silt loam soil (0 to 4% slopes). The experimental design was a randomized complete block with four replicates. Plots consisted of four 30-in spaced rows, 20 ft long and 10 ft wide with 5-ft alleys between plots. Standard corn production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of one non-treated check and seven fungicide treatments. Fungicides were applied using a CO_2-pressurized backpack sprayer equipped with TeeJet XR 8002-VS flat fan nozzles on a 10-ft boom calibrated to deliver 20 GPA at 40 psi. Treatments were applied at growth stages V10 (13 Jul), V14 (25 Jul), R1 (28 Jul), R2 (5 Aug), and R3 (15 Aug). One treatment was applied at V8 on 7 Jul and V12 (21 Jul) with guidance of the Tarspotter smartphone application. Plots were infested at a rate of 50 lbs/A of *Fusarium graminearum*-colonized corn grain at VT. Tar spot and ear rot were rated at the R5.5 growth stage (20 Sep). Tar spot was visually assessed by estimating average severity (% ear leaf with symptoms) on 5 leaves per plot with the aid of a standardized area diagram. Ear rot severity was assessed by visually rating five ears per plot in the center two rows with the aid of a standardized area diagram. Yield was determined by harvesting the center two rows of each plot using a small plot silage chopper with an onboard platform weigh system. Chopped sub-samples were collected from each plot and analyzed for deoxynivalenol (DON) content, forage quality total-tract neutral detergent fiber digestibility (TTNDFD), and milk production per ton of feed esti-



mate (Milk 2006). Data were analyzed using a mixed model analysis of variance and means were separated using Fisher's Least Significant Difference (LSD; α=0.05).

All application timings of Delaro Complete had significantly higher canopy greening compared to the non-treated control except Delaro Complete applied at V10 and V12 (Table 4). All Delaro Complete application timings significantly reduced tar spot severity compared to not treating, with Delaro Complete applied at R3 having significantly lower tar spot severity among all treatments. There were no significant differences in ear rot severity, yield, TTNDFD, DON, and milk production among all treatments. Phytotoxicity was not observed for any treatment.

Table 4. Canopy greening, tar spot severity, ear rot severity, yield, TTNDFD, deoxynivalenol (DON), and Milk for silage corn treated with fungicide or not treated with fungicide in Wisconsin, 2022.

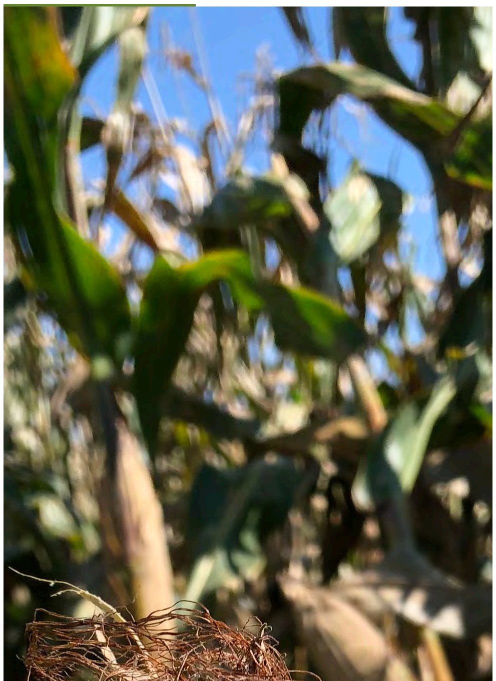
Treatment and rate/A (growth stage at application)	Canopy Greening (%)[z,y]	Tar Spot Severity (%)[x,y]	Ear Rot Severity (%)[w]	Yield (bu/A)	TTNDFD[v]	DON (ppm)[u]	Milk (lbs)[t]
Non-treated control	42.5 c	3.9 a	1.3	11.7	37.4	3.2	2991
Delaro Complete 3.83SC 8.0 fl oz (V10)	42.5 c	0.9 bc	0.5	11.4	40.2	1.3	3120
Delaro Complete 3.83SC 8.0 fl oz (V12)	47.5 bc	1.6 b	1.9	11.9	39.5	2.7	3075
Delaro Complete 3.83SC 8.0 fl oz (V14)	55.0 ab	0.8 bc	2.0	11.5	38.8	1.5	3099
Delaro Complete 3.83SC 8.0 fl oz (R1)	52.5 b	1.3 bc	1.0	11.4	37.7	2.0	2972
Delaro Complete 3.83SC 8.0 fl oz (R2)	62.5 a	0.6 c	2.0	11.5	39.0	1.4	3044
Delaro Complete 3.83SC 8.0 fl oz (R3)	52.5 b	0.2 d	1.8	11.5	38.0	2.4	2980
Delaro Complete 3.83SC 8.0 fl oz (Model)[s]	52.5 b	0.7 c	0.6	11.3	37.4	3.0	3005
P-value	<0.05	<0.05	ns[r]	ns[r]	ns[r]	ns[r]	ns[r]

[z]Greening effect determined by rating the percentage green foliage still present in each plot at early black layer.
[y]Means followed by the same letter are not significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).
[x]Tar spot severity was visually assessed as the average % ear leaf symptomatic per plot with the aid of a standard area diagram; means for each plot were used in the analysis.
[w]Ear rot severity assessed visually on 5 ears per plot with the aid of a standardized area diagram.
[v]Total-Tract Neutral Detergent Fiber Digestibility
[u]Deoxynivalenol (DON) content were analyzed for each plot; means for each plot were used in the analysis.
[t]Pounds of milk produced per dry-matter ton of feed consumed as calculated by the Milk 2006 index of forage quality
[s]Model application sprays were determined using the Tarspotter smartphone application which recommended applications at V8 and again at V12.
[r]ns = not significant (α=0.05)

Trial 5: Evaluation of foliar fungicides for control of tar spot and ear rot on silage corn in Arlington, Wisconsin, 2022- Experiment #2

SILAGE CORN (*Zea mays* 'B10B77SX')
Tar spot; *Phyllachora maydis*
Ear rot; *Gibberella zeae*

The trial was established at the Arlington Agricultural Research Station located in Arlington, WI. The corn hybrid 'B10B77SX' (110-day relative maturity brown midrib hybrid) was chosen for this trial. Wheat preceded this crop. Corn was planted on 12 May in a field consisting of Joy silt loam soil (0 to 4% slopes). The experimental design was a randomized complete block with four replicates. Plots consisted of four 30-in spaced rows, 20 ft long and 10 ft wide with 5-ft alleys between plots. Standard corn production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of one non-treated check and six fungicide treatments for each hybrid. Fungicides were applied using a CO_2-pressurized backpack sprayer equipped TeeJet XR 8002-VS flat fan nozzles on a 10-ft boom calibrated to deliver 20 GPA at 40 psi. Treatments were applied at growth stages V5 (17 Jun) followed by R1 (28 Jul), V14 (25 Jul), and R1 alone. One treatment was applied at V8 on 7 Jul and V12 (21 Jul) with guidance of the Tarspotter smartphone application. Plots were infested at a rate of 50 lbs/A of *Fusarium*



graminearum-colonized corn grain at VT. Tar spot and ear rot were rated at the R5.5 growth stage (20 Sep). Tar spot was visually assessed by estimating average severity (% ear leaf with symptoms) on 5 leaves per plot with the aid of a standardized area diagram. Ear rot severity was assessed by visually rating five ears per plot in the center two rows with the aid of a standardized area diagram. Yield was determined by harvesting the center two rows of each plot using a small plot silage chopper with an onboard platform weigh system. Chopped sub-samples were collected from each plot and analyzed for deoxynivalenol (DON) content, forage quality total-tract neutral detergent fiber digestibility (TTNDFD), and milk production per ton of feed estimate (Milk 2006). Data were analyzed using a mixed model analysis of variance and means were separated using Fisher's Least Significant Difference (LSD; α=0.05).

Applications of Proline, Headline AMP, Veltyma, Revytek, Miravis Neo, and Quilt Excel applied at R1 had significantly higher canopy greening compared to not treating (Table 5). All treatments significantly reduced tar spot severity compared to the non-treated check except Miravis Neo applied at R1. Miravis Neo applied at V14 and R1 and Revytek applied at R1 led to a significant reduction in DON compared to the non-treated check. There were no significant differences in ear rot severity, yield, TTNDFD, and milk production among all treatments. Phytotoxicity was not observed for any treatment.

Table 5. Canopy greening, tar spot severity, ear rot severity, yield, TTNDFD, deoxynivalenol (DON), and Milk for silage corn treated with fungicide or not treated with fungicide in Wisconsin, 2022.

Treatment and rate/A (growth stage at application)	**Canopy Greening** (%)[z,y]	**Tar Spot Severity** (%)[x,y]	**Ear Rot Severity** (%)[w]	**Yield** (tons dry matter/A)	**TTNDFD**[v]	**DON** (ppm)[u,y]	**Milk** (lbs)[t]
Non-treated check	42.5 d	3.0 a	2.4	11.2	38.4	3.3 a-c	3040
Proline 5.7 fl oz (R1)[s]	61.3 a-c	1.0 b-d	3.2	11.3	37.8	3.4 a-c	3082
Headline AMP 14.4 fl oz (R1)[s]	55.0 a-c	1.0 b-d	2.8	11.5	39.3	3.2 a-d	3017
Delaro Complete 3.83SC 8.0 fl oz (R1)[s]	52.5 a-d	1.5 bc	1.4	10.9	38.4	3.4 a-c	3031
Veltyma 3.34SC 7.0 fl oz (R1)[s]	58.8 a-c	0.8 d	2.0	11.5	38.2	3.0 a-d	3042
Revytek 3.33LC 8.0 fl oz (R1)[s]	56.3 a-c	0.8 cd	3.5	11.0	39.9	1.6 d-f	3042
Miravis Neo 2.5SE 13.7 fl oz (R1)[s]	57.5 a-c	1.7 ab	1.9	10.7	37.4	1.2 f	3032
Quilt Xcel 2.2SE 14.0 fl oz (R1)[s]	62.5 a	1.5 b-d	2.1	11.4	38.9	4.0 ab	3026
Headline AMP 14.4 fl oz (R1)[s] + Proline 5.7 fl oz (R1)[s]	50.0 cd	1.3 b-d	1.6	11.3	38.8	2.6 a-e	3030
Miravis Neo 2.5SE 13.7 fl oz (V14)	47.5 b-d	1.5 bc	1.4	11.4	40.6	1.4 ef	3144
Trivapro 2.21EC 13.7 fl oz (V14)	52.5 a-d	1.2 b-d	0.9	11.8	38.7	2.1 b-f	3086
Miravis Neo 2.5SE 13.7 fl oz (V5 + R1)[s]	50.0 cd	1.5 b-d	1.9	11.1	38.1	1.8 c-f	3014
Delaro Complete 3.83SC 8.0 fl oz (Model)[r]	50.0 cd	1.0 b-d	2.6	11.0	37.2	4.9 a	2946
P-value	<0.05	<0.05	ns[q]	ns	ns	<0.05	ns

[z]Greening effect determined by rating the percentage green foliage still present in each plot at early black layer.
[y]Means followed by the same letter are not significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).
[x]Tar spot severity was visually assessed as the average % ear leaf symptomatic per plot with the aid of a standard area diagram; means for each plot were used in the analysis.
[w]Ear rot severity assessed visually on 5 ears per plot with the aid of a standardized area diagram.
[v]Total-Tract Neutral Detergent Fiber Digestibility
[u]Deoxynivalenol (DON) content were analyzed for each plot; means for each plot were used in the analysis.
[t]Pounds of milk produced per dry-matter ton of feed consumed as calculated by the Milk 2006 index of forage quality
[s]Treatments including the non-ionic surfactant Induce 90SL at 0.25 %v/v
[r]Model application sprays were determined using the Tarspotter smartphone application which recommended applications at V8 and again at V12.
[q]ns = not significant (α=0.05)

Trial 6: Evaluation of foliar fungicide treatments for control of Sclerotinia stem rot of soybean in Arlington, Wisconsin, 2022- Experiment #1

SOYBEAN (*Glycine max* 'Xitavo XO 2472E')
Sclerotinia stem rot; *Sclerotinia sclerotiorum*

The trial was established at the Arlington Agricultural Research Station located in Arlington, WI. The soybean cultivar 'Xitavo XO 2472E' was chosen for this study. Soybeans were planted on 12 May in a field consisting of Plano silt loam soil (0 to 2% slopes) and Joy silt loam soil (0-4% slopes). The experimental design was a randomized complete block with four replicates. Plots consisted of four 30-in. spaced rows, 20 ft long and 10 ft wide with 5-ft alleys between plots. Standard soybean production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of a non-treated control and 11 fungicide treatments. Fungicide treatments were mixed with the non-ionic surfactant, Induce 90SL, at 0.25% v/v. Pesticides were applied using a CO_2-pressurized backpack sprayer equipped with TeeJet XR 8002-VS flat fan nozzles calibrated to deliver 20 GPA at 30 psi. Pesticides were applied at the R3 growth stage on 25 Jul. Sclerotinia stem rot severity index (DSI) was determined by rating 30 arbitrarily selected plants in each plot and scoring plants on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on main stem with little effect on pod fill; 3 = infection on main stem resulting in death or poor pod fill. The scores of the 30 plants were totaled for each class and divided by 0.9. Disease incidence (DI) was scored as percentage of symptomatic plants relative to the total stand. The DI and DSI were then combined to calculate the disease index (DIX) where DIX=DI*(Average DSI/3). Yield (corrected to 13% moisture) was determined by harvesting the center two rows of each plot using an Almaco SPC40 small-plot combine equipped with a HarvestMaster HM800 Classic grain gauge. All disease and yield data were analyzed with SAS PROC Glimmix using a mixed model analysis of variance, and means were separated using Fisher's least significant difference (α=0.05).

Low levels of Sclerotinia stem rot were observed for this trial. The non-treated control had the lowest levels of Sclerotinia stem rot incidence, DSI, and DIX. Veltyma and Delaro Complete applied at R3 did not differ significantly in Sclerotinia stem rot incidence compared to non-treated control (Table 6). Applications of Topguard EQ, Quadris, Veltyma, and Delaro Complete at R3 did not differ in DIX compared to not treating. No significant differences were observed for yield among all treatments. Phytotoxicity was not observed for any treatment.

Table 6. Sclerotinia stem rot disease incidence, Sclerotinia stem rot disease severity index (DSI), DIX, and yield for soybean treated with fungicide or not treated with fungicide in Wisconsin, 2022.

Treatment and rate/A (crop stage at application)[z]	**Disease Incidence** (%)[y,x]	**Sclerotinia Stem Rot DSI** (0-100)[w,x]	**DIX**[v,x]	**Yield** (bu/A)
Non-treated check	0.7 e	3.6 d	0.5 d	85.9
Topguard EQ 4.29SC 5.0 fl oz (R3)	2.4 a-d	12.9 a-c	1.6 a-d	85.3
Lucento 4.17SC 5.0 fl oz (R3)	2.8 a-c	18.6 ab	2.5 ab	83.9
Trivapro 2.21EC 13.7 fl oz (R3)	2.2 a-d	14.6 a-c	2.0 a-c	87.1
Quadris 2.08F 6.0 fl oz (R3)	1.1 c-d	5.0 cd	0.6 cd	86.3
Veltyma 3.34SC 7.0 fl oz (R3)	1.5 b-e	11.9 a-d	1.4 a-d	87.5
Revytek 3.33LC 8.0 fl oz (R3)	3.7 ab	18.7 ab	2.6 a-c	85.7
Chlorothalonil 6.0SC 36.0 fl oz (R3) Folicur 3.6F 4.0 fl oz (R3) Topsin-M 4.5F 20.0 fl oz (R3)	3.9 ab	19.9 a	2.8 ab	85.9
Delaro Complete 3.83SC 8.0 fl oz (R3)	0.9 de	6.0 b-d	0.8 b-d	85.0
Miravis Neo 2.5SE 13.7 fl oz (R3)	4.8 a	31.0 a	4.1 a	83.7
Topsin-M 4.5F 20.0 fl oz (R3)	2.7 a-c	19.9 a	2.6 ab	87.2
Experimental 1 (R3)	2.2 a-d	15.3 a-c	2.0 a-c	87.7
P-value	<0.01	<0.01	<0.01	ns[t]

[z] Induce 90% SL (Non-ionic surfactant) at 0.25% v/v was added to all fungicide treatments
[y] Percentage of symptomatic plants relative to the total stand.
[x] Means followed by the same letter are not significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).
[w] Sclerotinia stem rot DSI was generated by rating 30 arbitrarily selected plants in each plot and scoring plants with on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on main stem with little effect on pod fill; 3 = infection on main stem resulting in death or poor pod fill. The scores of the 30 plants were totaled for each class and divided by 0.9.
[v] DIX=DI*(Average DSI/3)
[t] ns = not significant (α=0.05).

Trial 7: Evaluation of foliar fungicide treatments for control of Sclerotinia stem rot of soybean in Hancock, Wisconsin, 2022- Experiment #2

SOYBEAN (*Glycine max* 'Xitavo XO 2472E')
Sclerotinia stem rot; *Sclerotinia sclerotiorum*

The trial was established at the Hancock Agricultural Research Station located in Hancock, WI. The soybean cultivar 'Xitavo XO 2472E' was chosen for this study. Soybeans were planted on 27 May in a field with a Plainfield sand (0 to 2% slopes). The trial was planted in a field with history of severe Sclerotinia stem rot. The field was overhead irrigated as needed to prevent drought stress. The experimental design was a randomized complete block with four replicates. Plots consisted of four 30-in. spaced rows, 20 ft long and 10 ft wide with 5-ft alleys between plots. Standard soybean production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of a non-treated control and eight fungicide treatments. Pesticides were applied using a CO_2-pressurized backpack sprayer equipped with TeeJet XR 8002-VS flat fan nozzles calibrated to deliver 20 GPA at 30 psi. Pesticides were applied at growth stages R1 (19 Jul) and R3 (2 Aug) or at both R1 and R3. Sclerotinia stem rot incidence and severity were rated at R6 on 8 Sep. Sclerotinia stem rot severity index (DSI) was determined by rating 30 arbitrarily selected plants in each plot and scoring plants on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on main stem with little effect on pod fill; 3 = infection on main stem resulting in death or poor pod fill. The scores of the 30 plants were totaled for each class and divided by 0.9. Disease incidence was scored as percentage of symptomatic plants relative to the total stand. The DI and DSI were then combined to calculate the disease index (DIX) where DIX=DI*(Average DSI/3). Yield (corrected to 13% moisture) was determined by harvesting the center two rows of each plot using an Almaco SPC40 small-plot combine equipped with a HarvestMaster HM800 Classic grain gauge. All disease and yield data were analyzed with SAS PROC Glimmix using a mixed model analysis of variance, and means were separated using Fisher's least significant difference (α=0.05).

Due to overhead irrigation throughout the season and history of severe Sclerotinia stem rot, conditions were favorable for disease development, and pressure was high in this trial. However, no significant differences were observed for Sclerotinia stem rot incidence, DSI, DIX, and yield among all treatments (Table 7). Phytotoxicity was not observed for any treatment.

Table 7. Sclerotinia stem rot disease incidence, Sclerotinia stem rot disease severity index (DSI), DIX, and yield for soybean treated with fungicide or not treated with fungicide in Wisconsin, 2022.

Treatment and rate/A (crop stage at application)	**Disease Incidence** (%)[z]	**Sclerotinia Stem Rot DSI** (0-100)[y]	**DIX**[x]	**Yield** (bu/A)
Non-treated check	46.5	99.5	46.4	42.7
Affiance 1.5SC, 10.0 fl oz (R1)	38.9	88.4	35.7	43.7
Domark 230ME, 5.0 fl oz (R1)	47.3	94.6	45.2	41.4
Affiance 1.5SC, 10.0 fl oz (R3)	46.9	99.2	47.0	40.0
Domark 230ME, 5.0 fl oz (R3)	42.7	96.9	41.8	38.8
Affiance 1.5SC, 10.0 fl oz (R1) Domark 230ME, 5.0 fl oz (R3)	45.6	95.8	44.9	42.2
Domark 230ME, 5.0 fl oz (R1) Affiance 1.5SC, 10.0 fl oz (R3)	49.7	98.9	49.3	35.7
Domark 230ME, 7.0 fl oz (R1)	39.1	97.8	38.3	42.0
Affiance 1.5SC, 15.0 fl oz (R1)	49.4	97.7	48.4	37.6
P-value	ns[w]	ns	ns	ns

[z] Percentage of symptomatic plants relative to the total stand.
[y] Sclerotinia stem rot DSI was generated by rating 30 arbitrarily selected plants in each plot and scoring plants with on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on main stem with little effect on pod fill; 3 = infection on main stem resulting in death or poor pod fill. The scores of the 30 plants were totaled for each class and divided by 0.9.
[x] DIX=DI*(Average DSI/3)
[w] ns = not significant according to Fisher's least significant difference (α=0.05).

Trial 8: Evaluation of an herbicide and fungicides for control of Sclerotinia stem rot of soybean in Hancock, Wisconsin, 2022- Experiment #3

SOYBEAN (*Glycine max* 'Xitavo XO 2472E')
Sclerotinia stem rot; *Sclerotinia sclerotiorum*

The trial was established at the Hancock Agricultural Research Station located in Hancock, WI. The soybean cultivar 'Xitavo XO 2472E' was chosen for this study. Soybeans were planted on 27 May in a field with a Plainfield sand (0 to 2% slopes). The trial was planted in a field with history of severe Sclerotinia stem rot. The field was overhead irrigated as needed to prevent drought stress. The experimental design was a randomized complete block with four replicates. Plots consisted of four 30-in. spaced rows, 20 ft long and 10 ft wide with 5-ft alleys between plots. Standard soybean production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of a non-treated control and 15 fungicide or herbicide treatments. Most fungicide treatments applied at R1 and R3 were mixed with the non-ionic surfactant, Induce 90SL, at 0.25% v/v. Pesticides were applied using a CO_2-pressurized backpack sprayer equipped with TeeJet XR 8002-VS flat fan nozzles calibrated to deliver 20 GPA at 30 psi. Some treatments were applied with TeeJet XR 80015-VS flat fan nozzles placed on a 360-drop nozzle body calibrated to 20 GPA. Pesticides were applied as a seed treatment or at growth stages V4 (1 Jun), R1 (19 Jun), and R3 (22 Jul), both V4 and R3 or both R1 and R3 growth stages. One treatment was applied at R3 based on guidance from the Sporecaster smartphone application. Sclerotinia stem rot incidence and severity were rated at R6 (14 Sep). Sclerotinia stem rot severity index (DSI) was determined by rating 30 arbitrarily selected plants in each plot and scoring plants on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on main stem with little effect on pod fill; 3 = infection on main stem resulting in death or poor pod fill. The scores of the 30 plants were totaled for each class and divided by 0.9. Disease incidence (DI) was scored as percentage of symptomatic plants relative to the total stand. The DI and DSI were then combined to calculate the disease index (DIX) where DIX=DI*(Average DSI/3). Yield (corrected to 13% moisture) was determined by harvesting the center two rows of each plot using an Almaco SPC40 small-plot combine equipped with a HarvestMaster HM800 Classic grain gauge. All disease and yield data were analyzed with SAS PROC Glimmix using a mixed model analysis of variance, and means were separated using Fisher's least significant difference (α=0.05).

Due to overhead irrigation throughout the season and history of severe Sclerotinia stem rot, conditions were favorable for disease development, and pressure was high in this trial. Applications of Endura applied at R1 + R3, Omega at R3 with 360-drop nozzles and Omega applied at R3 with 360-drop nozzles using the Sporecaster app significantly reduced Sclerotinia stem rot incidence and DSI compared to the non-treated check (Table 8). In addition to the treatments previously stated, Endura applied at R3 resulted in significantly lower DIX compared to not treating. All treatments resulted in significantly greater yield compared to the non-treated check except Cobra applied at V4, Cobra applied at R1 followed by Domark at R3, Omega at R1 followed by Miravis Neo at R3, Headsup seed treatment, Headsup seed treatment followed by Domark at R3, and Miravis Neo applied at R3. Phytotoxicity was observed in plots where Cobra 2EC was applied and lasted approximately two weeks post-application. Phytotoxicity was not observed in any other treatments.

Table 8. Sclerotinia stem rot disease incidence, Sclerotinia stem rot disease severity index (DSI), DIX, and yield for soybean treated with fungicide or not treated with fungicide in Wisconsin, 2022.

Treatment and rate/A (crop stage at application)	**Disease Incidence** (%)[z,y]	**Sclerotinia Stem Rot DSI** (0-100)[x,y]	**DIX**[w,y]	**Yield** (bu/A)[y]
Non-Treated Check	38.8 a-e	95.1 a-c	36.8 a-e	36.3 d
Endura 70WDG 8.0 oz (R1+R3)[v]	20.1 gh	58.0 e	15.1 gh	56.2 a
Endura 70WDG 8.0 oz (R3)[v]	25.5 e-h	67.2 c-e	19.1 f-h	54.2 a
Omega 500F 16.0 oz (R3)[v,u]	17.8 h	51.1 e	12.3 h	55.3 a
Omega 500F 16.0 oz (R3)[v]	28.3 d-h	69.7 b-e	21.8 e-g	54.3 a
Cobra 2.0EC 8.0 fl oz (V4)	45.6 a-c	94.1 a-c	43.2 a-c	41.7 cd

continued on next page

Treatment and rate/A (crop stage at application)	**Disease Incidence** (%)[z,y]	**Sclerotinia Stem Rot DSI** (0-100)[x,y]	**DIX**[w,y]	**Yield** (bu/A)[y]
Cobra 2.0EC 8.0 fl oz (V4) Domark 230ME, 5.0 fl oz (R3)[v]	44.3 a-d	92.0 a-c	41.0 a-d	41.2 cd
Omega 500F 12.0 oz (R1)[v] Miravis Neo 2.5SE 13.7 fl oz (R3)[v]	52.3 a	99.2 ab	51.8 a	41.0 cd
Delaro Complete 3.83SC 8.0 fl oz (R3)[v]	40.6 a-e	87.5 a-c	36.3 a-e	46.6 bc
Delaro Complete 3.83SC 8.0 fl oz (R3)[v,u]	31.4 b-g	106.2 a	26.9 c-f	51.5 ab
Headsup (Seed Treatment)	43.3 a-d	99.7 ab	43.0 a-c	35.6 d
Headsup (Seed Treatment) Domark 230ME, 5.0 fl oz (R3)[v]	49.2 a-c	100.8 ab	49.5 ab	38.0 d
Miravis Neo 2.5SE 16.0 fl oz (R3)[v]	51.0 a	99.1 ab	50.4 a	37.7 d
Cobra 2.0EC 8.0 fl oz (V4) Topsin-M 4.5F 20.0 fl oz (R3)	33.1 a-f	84.9 a-d	28.5 b-f	45.6 bc
Omega 500F 16.0 oz (Model)[v,u,t]	21.7 f-h	59.0 de	15.0 gh	56.3 a
Endura 70WDG 8.0 oz (Model)[v,t]	30.2 c-g	66.4 c-e	23.9 d-g	56.2 a
P-value	<0.01	<0.01	<0.01	<0.01

[z] Percentage of symptomatic plants relative to the total stand.
[y] Means followed by the same letter are not significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).
[x] Sclerotinia stem rot DSI was generated by rating 30 arbitrarily selected plants in each plot and scoring plants with on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on main stem with little effect on pod fill; 3 = infection on main stem resulting in death or poor pod fill. The scores of the 30 plants were totaled for each class and divided by 0.9.
[w] DIX=DI*(Average DSI/3)
[v] Induce 90% SL (Non-ionic surfactant) at 0.25% v/v was added to fungicide treatments
[u] 360 drop nozzles were used to apply treatments at 20 GPA.
[t] Model application sprays at R3 were determined using the Sporecaster smartphone application.

Trial 9: Evaluation of fungicides for control of Sclerotinia stem rot of soybean in Hancock, Wisconsin, 2022- Experiment#4

SOYBEAN (*Glycine max* 'Xitavo XO 2472E')
Sclerotinia stem rot; *Sclerotinia sclerotiorum*

The trial was established at the Hancock Agricultural Research Station located in Hancock, WI. The soybean cultivar 'Xitavo XO 2472E' was chosen for this study. Soybeans were planted on 27 May in a field with a Plainfield sand (0 to 2% slopes). The trial was planted in a field with history of severe Sclerotinia stem rot. The field was overhead irrigated as needed to prevent drought stress. The experimental design was a randomized complete block with four replicates. Plots consisted of four 30-in. spaced rows, 20 ft long and 10 ft wide with 5-ft alleys between plots. Standard soybean production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of a non-treated control and six fungicide treatments. Pesticides were applied using a CO_2-pressurized backpack sprayer equipped TeeJet XR 8002-VS flat fan nozzles calibrated to deliver 20 GPA at 30 psi. Pesticides were applied at R1 (19 Jun) and R3 (2 Aug) or both R1 and R3 growth stages. Sclerotinia stem rot incidence and severity were rated at R6 (8 Sep). Sclerotinia stem rot severity index (DSI) was determined by rating 30 arbitrarily selected plants in each plot and scoring plants on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on main stem with little effect on pod fill; 3 = infection on main stem resulting in death or poor pod fill. The scores of the 30 plants were totaled for each class and divided by 0.9. Disease incidence (DI) was scored as percentage of symptomatic plants relative to the total stand. The DI and DSI were then combined to calculate the disease index (DIX) where DIX=DI*(Average DSI/3). Yield (corrected to 13% moisture) was determined by harvesting the center two rows of each plot using an Almaco SPC40 small-plot combine equipped with a HarvestMaster HM800 Classic grain gauge. All disease and yield data were analyzed with SAS PROC Glimmix using a mixed model analysis of variance, and means were separated using Fisher's least significant difference (α=0.05).

Due to overhead irrigation throughout the season and history of severe Sclerotinia stem rot, conditions were favorable for disease development, and pressure was high in this trial. Endura applied at R3 had significantly lower Sclerotinia stem rot incidence and DSI than the non-treated check (Table 9). Applications of Endura at R1 and Endura at R3 had significantly lower DIX compared to the non-treated check. Delaro complete applied at R1 followed by Delaro Complete at R3 resulted in significantly greater yield compared to not treating. Phytotoxicity was not observed for any treatments.

Table 9. Sclerotinia stem rot disease incidence, Sclerotinia stem rot disease severity index (DSI), DIX, and yield for soybean treated with fungicide or not treated with fungicide in Wisconsin, 2022.

Treatment and rate/A (crop stage at application)	**Disease Incidence** (%)[z,y]	**Sclerotinia Stem Rot DSI** (0-100)[x,y]	**DIX** [w,y]	**Yield** (bu/A)
Non-Treated Check	38.8 a-c	96.2 a	36.8 ab	40.8 bc
Delaro Complete 3.83SC 8.0 fl oz (R1)[v]	43.2 ab	94.9 a	42.9 a	40.3 bc
Delaro Complete 3.83SC 8.0 fl oz (R1)[v] Delaro Complete 3.83SC 8.0 fl oz (R3)[v]	29.8 b-d	81.2 a	26.4 bc	53.9 a
Miravis Neo 2.5SE 13.7 fl oz (R1)[v]	44.0 ab	98.9 a	43.4 a	34.1 c
Endura 70WDG 6.0 oz (R1)[v]	26.9 cd	73.2 ab	23.0 c	48.2 ab
Revytek 3.33LC 8.0 fl oz (R1)[v]	49.3 a	98.3 a	49.2 a	33.6 c
Endura 70WDG 6.0 oz (R3)[v]	22.0 d	44.5 b	17.8 c	46.0 ab
P-value	<0.01	<0.01	<0.01	ns[u]

[z] Percentage of symptomatic plants relative to the total stand.
[y] Means followed by the same letter are not significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).
[x] Sclerotinia stem rot DSI was generated by rating 30 arbitrarily selected plants in each plot and scoring plants with on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on main stem with little effect on pod fill; 3 = infection on main stem resulting in death or poor pod fill. The scores of the 30 plants were totaled for each class and divided by 0.9.
[w] DIX=DI*(Average DSI/3)
[v] Induce 90% SL (Non-ionic surfactant) at 0.125% v/v was added to fungicide treatments
[u] ns = not significant (α=0.05).

Trial 10: Evaluation of fungicides for control of Sclerotinia stem rot of soybean in Hancock, Wisconsin, 2022- Experiment #5

SOYBEAN (*Glycine max* 'Xitavo XO 2472E')
Sclerotinia stem rot; *Sclerotinia sclerotiorum*

The trial was established at the Hancock Agricultural Research Station located in Hancock, WI. The soybean cultivar 'Xitavo XO 2472E' was chosen for this study. Soybeans were planted on 27 May in a field with a Plainfield sand (0 to 2% slopes). The trial was planted in a field with history of severe Sclerotinia stem rot. The field was overhead irrigated as needed to prevent drought stress. The experimental design was a randomized complete block with four replicates. Plots consisted of four 30-in. spaced rows, 20 ft long and 10 ft wide with 5-ft alleys between plots. Standard soybean production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of a non-treated control and four fungicide treatments. Pesticides were applied using a CO_2-pressurized backpack sprayer equipped with TeeJet XR 8002-VS flat fan nozzles calibrated to deliver 20 GPA at 30 psi. Pesticides were applied as a pre-emerge (30 May) and R1 (19 Jun) or both pre-emerge and R1 growth stages. Sclerotinia stem rot incidence and severity were rated at R6 (8 Sep). Sclerotinia stem rot severity index (DSI) was determined by rating 30 arbitrarily selected plants in each plot and scoring plants on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on main stem with little effect on pod fill; 3 = infection on main stem resulting in death or poor pod fill. The scores of the 30 plants were totaled for each class and divided by 0.9. Disease incidence (DI) was scored as percentage of symptomatic plants relative to the total stand. The DI and DSI were then combined to calculate the disease index (DIX) where DIX=DI*(Average DSI/3). Yield (corrected to 13% moisture) was determined by harvesting the center two rows of each plot

using an Almaco SPC40 small-plot combine equipped with a HarvestMaster HM800 Classic grain gauge. All disease and yield data were analyzed with SAS PROC Glimmix using a mixed model analysis of variance, and means were separated using Fisher's least significant difference (α=0.05).

Due to overhead irrigation throughout the season and history of severe Sclerotinia stem rot, conditions were favorable for disease development, and pressure was high in this trial. No significant differences were observed for Sclerotinia stem rot incidence, DSI, DIX, or yield among all treatments (Table 10). Phytotoxicity was not observed for any treatment.

Table 10. Sclerotinia stem rot disease incidence, Sclerotinia stem rot disease severity index (DSI), DIX, and yield for soybean treated with fungicide or not treated with fungicide in Wisconsin, 2022.

Treatment and rate/A (crop stage at application)	**Disease Incidence** (%)[z]	**Sclerotinia Stem Rot DSI** (0-100)[y]	**DIX** [x]	**Yield** (bu/A)[w]
Non-Treated Check	54.3	99.2	54.4	38.1
Experimental 1 (Pre-emerge)	60.5	97.8	60.3	39.0
Experimental 1 (Pre-emerge) Experimental 2 (R1)	45.8	100.1	45.9	37.4
Endura 70WDG 8.0 oz (R1)	44.0	93.1	41.0	46.5
Endura 70WDG 8.0 oz (R1) Experimental 2 (R1)	49.3	94.6	46.7	44.2
P-value	ns[v]	ns	ns	ns

[z] Percentage of symptomatic plants relative to the total stand.
[y] Sclerotinia stem rot DSI was generated by rating 30 arbitrarily selected plants in each plot and scoring plants with on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on main stem with little effect on pod fill; 3 = infection on main stem resulting in death or poor pod fill. The scores of the 30 plants were totaled for each class and divided by 0.9.
[x] DIX=DI*(Average DSI/3)
[w] Means followed by the same letter are not significantly different based on Fisher's Least Significant Difference (LSD; α=0.05).
[v] ns = not significant (α=0.05).

Trial 11: Evaluation of fungicides for control of Sclerotinia stem rot of soybean in Hancock, Wisconsin, 2022- Experiment #6

SOYBEAN (*Glycine max* 'Xitavo XO 2472E')
Sclerotinia stem rot; *Sclerotinia sclerotiorum*

The trial was established at the Hancock Agricultural Research Station located in Hancock, WI. The soybean cultivar 'Xitavo XO 2472E' was chosen for this study. Soybeans were planted on 27 May in a field with a Plainfield sand (0 to 2% slopes). The trial was planted in a field with history of severe Sclerotinia stem rot. The field was overhead irrigated as needed to prevent drought stress. The experimental design was a randomized complete block with four replicates. Plots consisted of four 30-in. spaced rows, 20 ft long and 10 ft wide with 5-ft alleys between plots. Standard soybean production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of a non-treated control and three fungicide treatments. Pesticides were applied using a CO_2-pressurized backpack sprayer equipped with TeeJet XR 8002-VS flat fan nozzles calibrated to deliver 20 GPA at 30 psi. Pesticides were applied at R3 (2 Aug) or both R1 (19 Jul) and R3 growth stages. Sclerotinia stem rot incidence and severity were rated at R6 (8 Sep). Sclerotinia stem rot severity index (DSI) was determined by rating 30 arbitrarily selected plants in each plot and scoring plants on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on main stem with little effect on pod fill; 3 = infection on main stem resulting in death or poor pod fill. The scores of the 30 plants were totaled for each class and divided by 0.9. Disease incidence (DI) was scored as percentage of symptomatic plants relative to the total stand. The DI and DSI were then combined to calculate the disease index (DIX) where DIX=DI*(Average DSI/3). Yield (corrected to 13% moisture) was determined by harvesting the center two rows of each plot using an Almaco SPC40 small-plot combine equipped with a HarvestMaster HM800 Classic grain gauge. All disease and yield data were analyzed with SAS PROC Glimmix using a mixed model analysis of variance,

and means were separated using Fisher's least significant difference (α=0.05).

Due to overhead irrigation throughout the season and history of severe Sclerotinia stem rot, conditions were favorable for disease development, and pressure was high in this trial. However, no significant differences were observed for Sclerotinia stem rot incidence, DSI, DIX, and yield among all treatments (Table 11). Phytotoxicity was not observed for any treatment.

Table 11. Sclerotinia stem rot disease incidence, Sclerotinia stem rot disease severity index (DSI), DIX, and yield for soybean treated with fungicide or not treated with fungicide in Wisconsin, 2022.

Treatment and rate/A (crop stage at application)	**Disease Incidence** (%)[z]	**Sclerotinia Stem Rot DSI** (0-100)[y]	**DIX** [x]	**Yield** (bu/A)
Non-Treated Check	67.0	94.2	64.8	40.4
Endura 70WDG 4.0 oz (R3)[v] Priaxor 4.17SC 4.0 fl oz (R3)	45.9	91.6	43.6	43.0
Endura 70WDG 6.0 oz (R3)[v] Priaxor 4.17SC 4.0 fl oz (R3)	32.7	88.6	31.2	46.3
Endura 70WDG 6.0 oz (R1)[v] Priaxor 4.17SC 4.0 fl oz (R3)	45.4	96.0	44.3	43.7
P-value	ns[w]	ns	ns	ns

[z] Percentage of symptomatic plants relative to the total stand.
[y] Sclerotinia stem rot DSI was generated by rating 30 arbitrarily selected plants in each plot and scoring plants with on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on main stem with little effect on pod fill; 3 = infection on main stem resulting in death or poor pod fill. The scores of the 30 plants were totaled for each class and divided by 0.9.
[x] DIX=DI*(Average DSI/3)
[w] ns = not significant (α=0.05).

Trial 12: Evaluation of conventional soybean cultivars and planting populations in a rye/roller-crimping system for comparisons of yield in Arlington, Wisconsin, 2022

SOYBEAN: (*Glycine max* 'W19-1190', 'W19-1321', 'W19-2484', 'W16-5282B', 'Dwight')

The trial was established at the Arlington Agricultural Research Station located in Arlington, WI. The conventional soybean cultivars 'W19-1190', 'W19-1321', 'W19-2484', 'W16-5282B', 'Dwight' were chosen for this study. Soybeans were planted on 1 Jun in a field with a Plano silt loam (2 to 6% slopes). The experimental design was 5 x 3 factorial arranged in a randomized complete block with four replicates. Cultivar and planting populations were randomized together within each replicate. Plots consisted of four 30-in. spaced rows, 20 ft long and 10 ft wide with 5-ft alleys between plots. Standard soybean production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Plots consisted of five cultivars with three seeding rates planted into roller crimped rye. Yield (corrected to 13% moisture) was determined by harvesting the center two rows of each plot using an Almaco SPC40 small-plot combine equipped with a HarvestMaster HM800 Classic grain gauge. Yield data were analyzed using a mixed model analysis of variance, and means were separated using Fisher's least significant difference (α=0.05).

Adequate precipitation and ideal growing conditions were observed for this trial. There were no significant differences in yield by cultivar, seeding rate, or hybrid by seeding rate (Table 12). Total average yield among all treatments was 61.2 bushels per acre.

Table 12. Yield for conventional soybean cutivars in a roller-crimper system in Wisconsin, 2022.

Conventional cultivar	**Population** (seeding rate/A)	**Yield** (bu/A)[y]
W19-1190	180,000	61.0
	220,000	58.0
	260,000	63.0
W19-1321	180,000	63.0
	220,000	58.0
	260,000	61.0
W19-2484	180,000	59.0
	220,000	60.0
	260,000	58.0
W16-5282B	180,000	57.0
	220,000	60.0
	260,000	68.0
Dwight	180,000	67.0
	220,000	63.0
	260,000	63.0
P-value		ns[z]

[z]ns = not significant (α=0.05)

Trial 13: Evaluation of foliar fungicides for control of Fusarium head blight of 'Kaskaskia' wheat in Wisconsin, 2022- Experiment #1

WHEAT, SOFT RED WINTER (*Triticum aestivum* 'Kaskaskia')
Fusarium Head Blight; *Fusarium graminearum*

The trial was established at the Arlington Agricultural Research Station located in Arlington, WI. The soft red winter wheat cultivar 'Kaskaskia' was chosen for this study. Wheat was planted on 29 Sep 2021 in a field with Plano silt loam (0-2% slopes) soil. The experimental design was a randomized complete block with four replicates. Plots were 20-ft long and 7.5-ft wide with 5-ft alleys between plots. Standard wheat production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of a non-treated control and eight fungicide treatments. Fungicide treatments applied at Feekes 10.5.1 were mixed with the non-ionic surfactant, Induce 90SL, at 0.125% v/v. Fungicides were applied using a CO_2 pressurized backpack sprayer equipped with TTJ60-11002 Turbo TwinJet flat fan nozzles calibrated to deliver 20 GPA at 28 psi. Fungicides were applied at anthesis (Feekes 10.5.1) on 7 Jun or using a two-spray program with the first spray occurring at jointing (Feekes 6) on 9 May and the second spray applied at anthesis. Plots were infested with 25 lb/A of *F. graminearum*-colonized corn grain on 20 May and 3 Jun. Plots were overhead irrigated daily with a linear irrigation system delivering 0.1 in. of water during the 10.5.1 growth stage to facilitate disease development. Fusarium head blight (FHB) was evaluated by visually estimating average incidence (% plants with symptoms) and average severity (% area of heads with symptoms) per plot with the aid of standardized area diagrams. The FHB Index was calculated by multiplying % disease incidence (DI) by % disease severity (DS) divided by 100 (FHB Index=DI x DS/100). Concentration of deoxynivalenol (DON) was also evaluated in grain harvested from each treatment (~75 grams) at the University of Minnesota DON testing lab. Test weight and yield (corrected to 13.5% moisture) were determined by harvesting the center 5 ft of each plot using an Almaco SPC40 small-plot combine equipped with a HarvestMaster HM800 Classic Grain gauge. 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).

Temperatures during the trial were average to above average for the growing region with adequate precipitation. Moderate levels of Fusarium head blight were observed in this trial

as overhead irrigation and rainfall promoted inoculum dispersal and infection. All treatments had significantly lower FHB incidence and FHB index compared to the non-treated check, except for Experimental 1 and 2 applied at Feekes 10.5.1 (Table 13). Sphaerex applied at Feekes 10.5.1 had significantly lower FHB severity among all treatments. Applications of Prosaro (8.2 fl oz), Prosaro Pro, Sphaerex, and Prosaro (6.5 fl oz) at Feekes 10.5.1 resulted in a significant reduction in DON compared to the non-treated check. Miravis Ace applied at Feekes 10.5.1 and Trivapro at Feekes 6 followed by Miravis Ace at Feekes 10.5.1 had significantly higher test weight than all other treatments. No significant differences were observed for yield among all treatments. Phytotoxicity was not observed for any treatment.

Table 13. Fusarium head blight (FHB) disease incidence, FHB severity, FHB index, deoxynivalenol (DON), test weight, and yield for soft red winter wheat treated with fungicide or not treated with fungicide in Wisconsin, 2022.

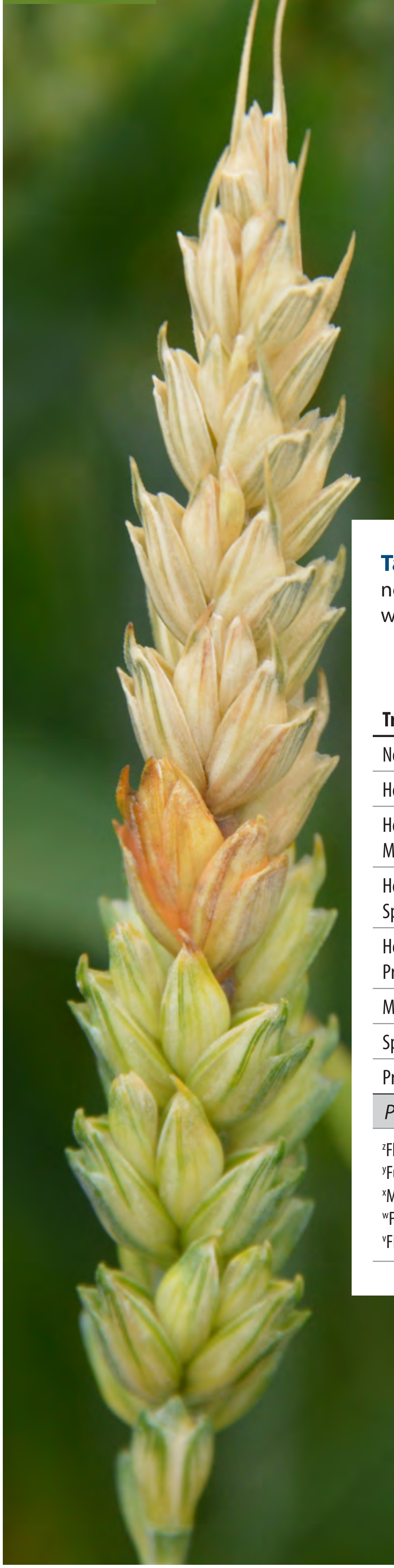
Treatment, rate/A	**Growth stage at application** (Feekes)[z]	**FHB Incidence** (%)[y,x]	**FHB Severity** (%)[w,x]	**FHB Disease Index** (%)[v,x]	**DON** (ppm)[x]	**Test Weight** (lb/A)[x]	**Yield** (bu/A)
Non-treated check		15.0 a	24.2 ab	3.7 a	0.48 ab	59.9 c	56.5
Prosaro 421SC, 8.2 fl oz[u]	10.5.1	2.1 b-d	18.0 b	0.4 b	0.25 c	60.5 b	62.7
Prosaro Pro 400SC, 10.3 fl oz[u]	10.5.1	2.4 bc	22.4 ab	0.6 b	0.27 c	60.5 b	61.4
Miravis Ace 5.2SC, 13.7 fl oz[u]	10.5.1	2.4 bc	16.3 b	0.4 b	0.33 bc	61.2 a	64.4
Sphaerex 2.5SC 7.3 fl oz[u]	10.5.1	1.0 d	10.1 c	0.1 c	0.25 c	60.1 bc	60.5
Prosaro 421SC, 6.5 fl oz[u]	10.5.1	3.1 b	18.5 b	0.6 b	0.27 c	60.4 b	61.1
Trivapro 2.21EC, 9.4 fl oz Miravis Ace 5.2SC, 13.7 fl oz[u]	6 fb 10.5.1	1.3 cd	18.0 b	0.3 b	0.33 bc	61.2 a	64.8
Experimental 1 10.9 fl oz[u]	10.5.1	20.3 a	32.4 a	6.6 a	0.61 a	60.0 bc	59.2
Experimental 2 12.0 fl oz[u]	10.5.1	14.3 a	21.6 ab	3.1 a	0.58 a	60.1 bc	58.5
P-value		<0.01	<0.01	<0.01	<0.01	<0.01	ns[t]

[z]Fb = followed by.
[y]Fusarium head blight incidence was visually assessed as the average % heads symptomatic per plot
[x]Means followed by the same letter are not significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)
[w]Fusarium head blight severity was visually assessed as the average % head symptomatic per plot
[v]FHB Index was calculated by multiplying % disease incidence (DI) by % disease severity (DS) divided by 100 (FHB Index=DI x DS/100).
[u]Induce 90% SL (Non-ionic surfactant) at 0.125% v/v was added to all fungicide treatments, fb = followed by.
[t]ns = not significant (α=0.05).

Trial 14: Evaluation of foliar fungicides for control of Fusarium head blight of 'Kaskaskia' wheat in Wisconsin, 2022-Experiment #2

WHEAT, SOFT RED WINTER (*Triticum aestivum* 'Kaskaskia')
Fusarium Head Blight; *Fusarium graminearum*

The trial was established at the Arlington Agricultural Research Station located in Arlington, WI. The soft red winter wheat cultivar 'Kaskaskia' was chosen for this study. Wheat was planted on 29 Sep 2021 in a field with Plano silt loam (0-2% slopes) soil. The experimental design was a randomized complete block with four replicates. Plots were 20-ft long and 7.5-ft wide with 5-ft alleys between plots. Standard wheat production practices as described by the University of Wisconsin Cooperative Extension Service were followed. Treatments consisted of a non-treated control and seven fungicide treatments. Fungicides were applied using a CO_2 pressurized backpack sprayer equipped with TTJ60-11002 Turbo TwinJet flat fan nozzles calibrated to deliver 20 GPA at 28 psi. Fungicides were applied at emerging flag leaf (Feekes 8) on 21 May, anthesis (Feekes 10.5.1) on 7 Jun or using a two-spray program with the first spray occurring at flag leaf and the second spray applied at anthesis. Plots were infested with 25 lb/A of *F. graminearum*-colonized corn grain on 20 May and 3 Jun. Plots were overhead irrigated daily with a linear irrigation system delivering 0.1 in. of water during the 10.5.1 growth stage to facilitate disease development. Fusarium head blight (FHB) was evaluated by visually estimating average incidence (% plants with symptoms) and average severity (% area of heads with symptoms) per plot with the aid



of standardized area diagrams. The FHB Index was calculated by multiplying % disease incidence (DI) by % disease severity (DS) divided by 100 (FHB Index=DI x DS/100). Concentration of deoxynivalenol (DON) was also evaluated in grain harvested from each treatment (~75 grams) at the University of Minnesota DON testing lab. Test weight and yield (corrected to 13.5% moisture) were determined by harvesting the center 5 ft of each plot using an Almaco SPC40 small-plot combine equipped with a HarvestMaster HM800 Classic Grain gauge. 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).

Temperatures during the trial were average to above average for the growing region with adequate precipitation. Moderate levels of Fusarium head blight were observed in this trial as overhead irrigation and rainfall promoted inoculum dispersal and infection. All fungicide applications had significantly lower FHB incidence, FHB Index, and DON than not treating, except Headline applied at Feekes 8. Headline applied at Feekes 8, Headline applied at Feekes 8 followed by Sphaerex at Feekes 10.5.1 and Prosaro Pro at Feekes 10.5.1 had no differences in FHB severity compared to the non-treated check (Table 14). Applications of Headline applied at Feekes 8 followed by Miravis Ace at Feekes 10.5.1, Miravis Ace at Feekes 10.5.1, and Sphaerex at Feekes 10.5.1 had significantly higher test weight compared to the non-treated control. Headline applied at Feekes 8 followed by Miravis Ace at Feekes 10.5.1 had significantly higher yield than all other tested products. Phytotoxicity was not observed for any treatment.

Table 14. Fusarium head blight (FHB) disease incidence, FHB severity, FHB index, deoxynivalenol (DON), test weight, and yield for soft red winter wheat treated with fungicide or not treated with fungicide in Wisconsin, 2022.

Treatment, rate/A	Growth stage at application (Feekes)[z]	FHB Incidence (%)[y,x]	FHB Severity (%)[w,x]	FHB Disease Index (%)[v,x]	DON (ppm)[x]	Test Weight (lb/A)[x]	Yield (bu/A)[x]
Non-treated check		16.6 a	31.2 a	5.2 a	0.7 a	60.1 d	58.7 bc
Headline 2.08SC, 6 fl oz	8	18.3 a	30.1 ab	5.5 a	0.6 a	60.5 cd	57.3 c
Headline 2.08SC, 6 fl oz Miravis Ace 5.2SC, 13.7 fl oz	8 fb 10.5.1	1.9 b	17.5 de	0.4 d	0.3 b	61.0 ab	66.1 a
Headline 2.08SC, 6 fl oz Sphaerex 2.5SC, 7.3 fl oz	8 fb 10.5.1	3.6 b	21.3 b-d	0.8 bc	0.2 b	60.4 cd	62.6 ab
Headline 2.08SC, 6 fl oz Prosaro Pro 400SC, 10.3 fl oz	8 fb 10.5.1	3.6 b	22.8 a-d	0.9 b	0.3 b	60.3 cd	58.3 bc
Miravis Ace 5.2SC, 13.7 fl oz	10.5.1	2.6 b	13.3 e	0.4 d	0.2 b	61.0 ab	60.7 bc
Sphaerex 2.5SC, 7.3 fl oz	10.5.1	2.1 b	19.9 cd	0.4 cd	0.2 b	60.8 a-c	58.8 bc
Prosaro Pro 400SC, 10.3 fl oz	10.5.1	0.8 b	27.6 a-c	1.0 b	0.2 b	60.5 b-d	56.3 c
P-value		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

[z]Fb = followed by.
[y]Fusarium head blight incidence was visually assessed as the average % heads symptomatic per plot
[x]Means followed by the same letter are not significantly different based on Fisher's Least Significant Difference (LSD; α=0.05)
[w]Fusarium head blight severity was visually assessed as the average % head symptomatic per plot
[v]FHB Index was calculated by multiplying % disease incidence (DI) by % disease severity (DS) divided by 100 (FHB Index=DI x DS/100).