

Soybean R3 Foliar Fungicide Trial

Key question: Are fungicides applied at R3 effective at reducing foliar disease and increasing yield?

Treatments: Strips with fungicide applied at R3 vs. strips with no fungicide application.

*Farmer's choice of product used.

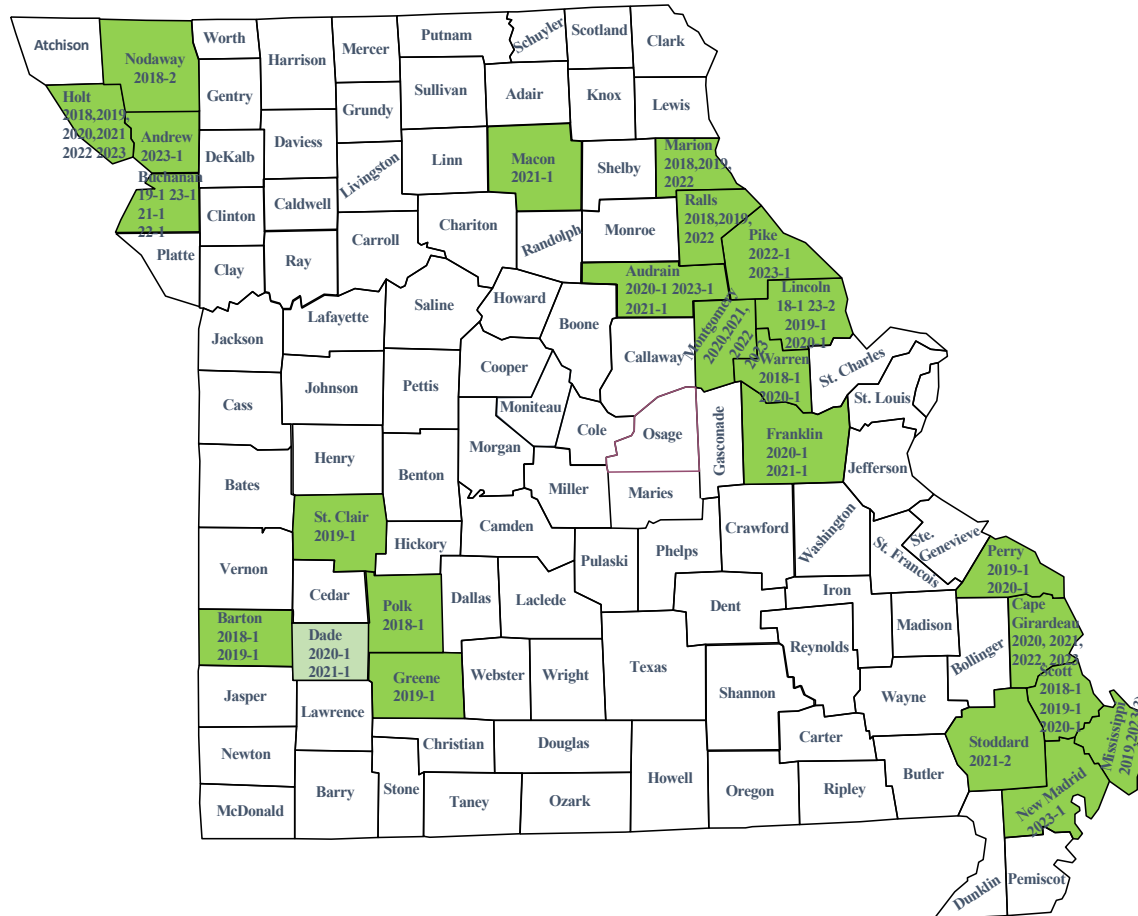
This on-farm research was supported by the Missouri Soybean Merchandizing Council (award No. 18-415) and University of Missouri Extension.

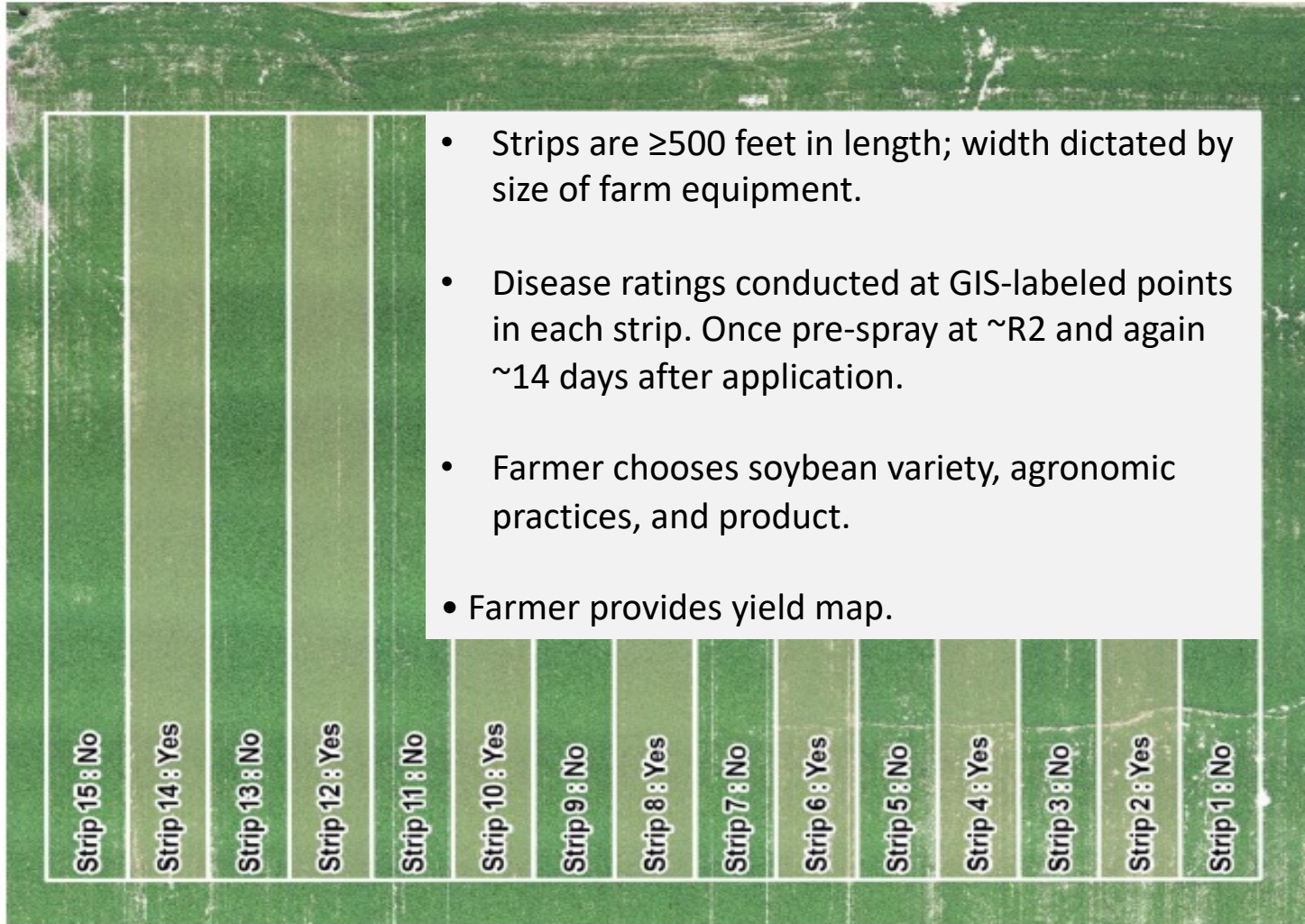
This on-farm research was only possible with the cooperation of Missouri Soybean farmers who volunteered to implement trials on their fields and the Regional MU Extension faculty that supported them.

Soybean R3 Foliar Fungicide Trial: 2018 to 2023

66 completed in six years

- 2018 (10)
- 2019 (11)
- 2020 (11)
- 2021 (11)
- 2022 (11)
- 2023 (12)





- Strips are ≥ 500 feet in length; width dictated by size of farm equipment.
- Disease ratings conducted at GIS-labeled points in each strip. Once pre-spray at $\sim R2$ and again ~ 14 days after application.
- Farmer chooses soybean variety, agronomic practices, and product.
- Farmer provides yield map.



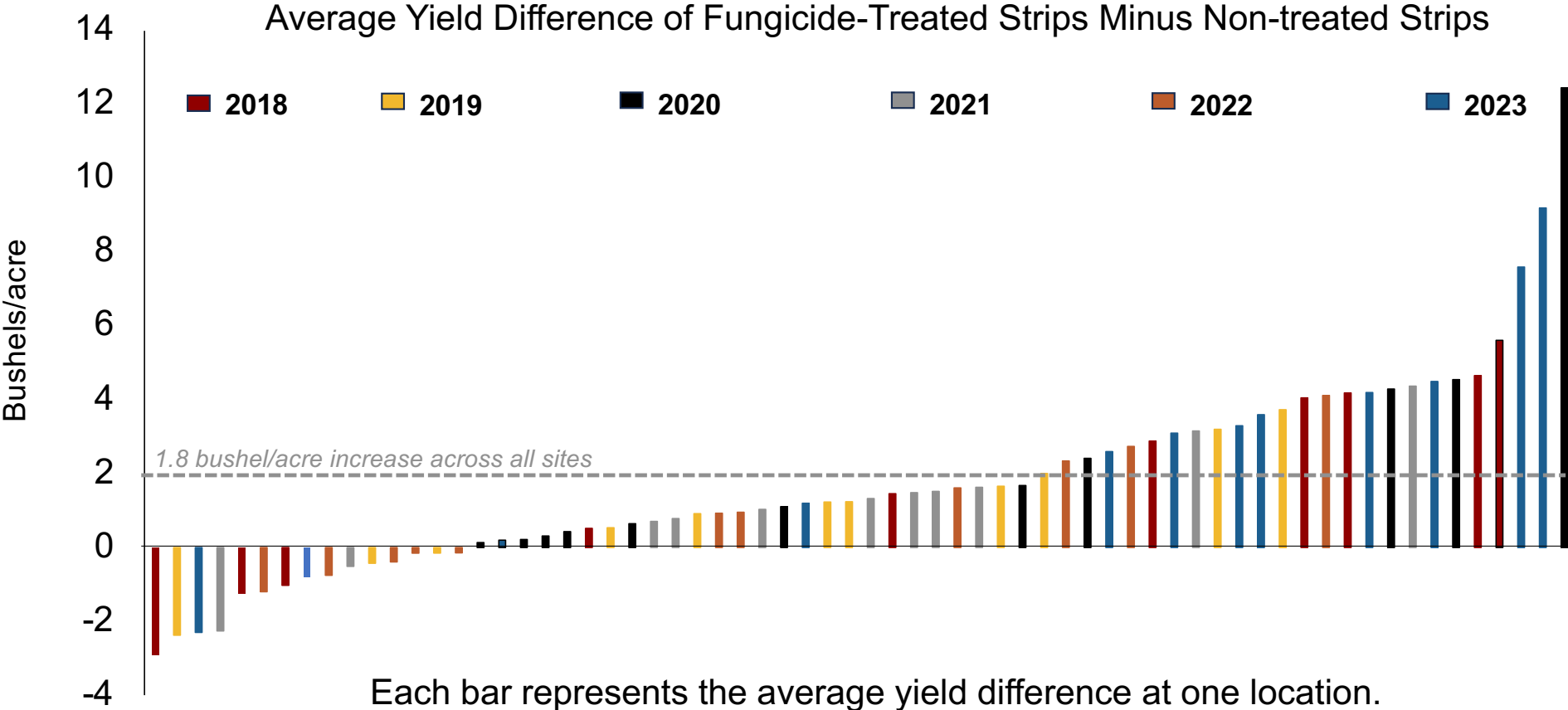
Most Common Agronomic Practices:

- Seeding rate = 140,000 s/a
- Row spacing = 15"
- Planting Date = May
- Maturity Group = 3.9

Most Common Products Tested

Fungicide	# Fields	Active ingredients	Group #
Miravis Top	6	difenoconazole+ pydiflumetofen	3,7
Cover XL	5	propiconazole + azoxystrobin	3,11
Trivapro	5	propiconazole + benzovindiflupyr + azoxystrobin	3,7,11
Priaxor Xemium	4	fluxapyroxad + pyraclostrobin	7,11

Soybean Yield 2018-2023



Soybean Yield 2018-2023

Yield Summary for Each Year

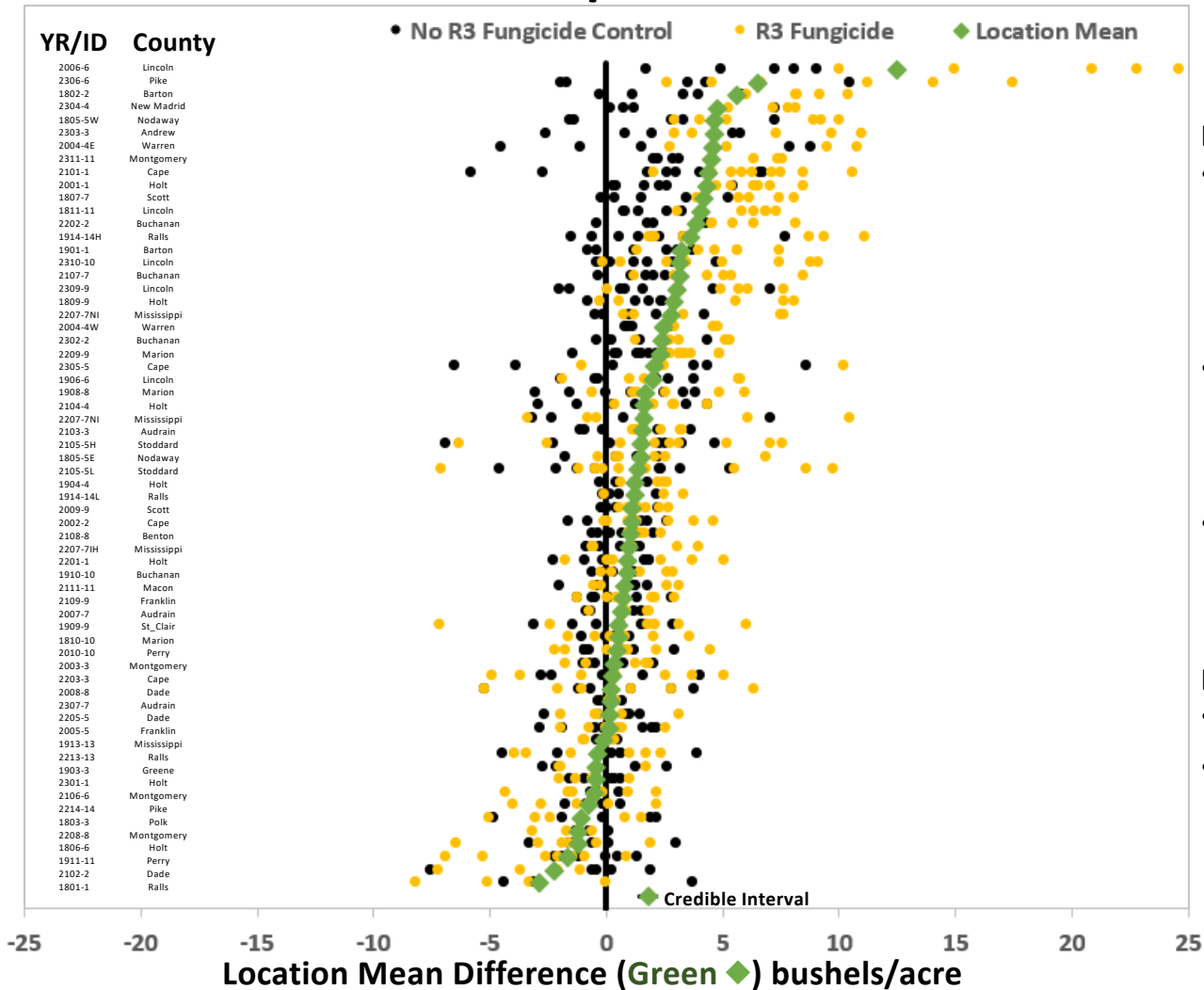
Median = yield of fungicide-treated strips – non-treated strips

Year	n	Median	Credible Interval (90%)
			- - - Bushels per Acre - - -
All sites	64	1.8	1.4 to 2.1
2018	10	1.9	1.0 to 2.8
2019	11	1.1	0.3 to 1.9
2020	11	2.2	1.4 to 3.0
2021	11	1.4	0.6 to 2.1
2022	11	1.0	0.2 to 1.8
2023	10*	3.0	2.1 to 3.9

The 1.8 bu/a median is comparable to results from Kandel et al (2021) who found a **2.7%** increase in yield of R3 fungicide treated soybean compared to non-treated soybean. That work was conducted in small plot trials across 9 states.

Kandel et al. 2021 Plant Disease 105:1382-1389

Yield Data for Each Strip: 2018-2023



How to interpret graph:

- **Green diamonds** are the mean effect of fungicide treatment for each location; Diamonds right of the center line indicate fungicide effect at that location was positive.
- **Black** (no R3 fungicide) and **gold** (R3 fungicide) symbols are strip yields for each location, as the difference from the location mean.
- **Credible interval** is the expected yield effect of R3 Fungicide based on these 64 trials (95% to 5% probability).

Key Points

- **R3 fungicide increased yield.**
- Mean effect was **1.8 bushels per acre** (90% credible interval 1.4 to 2.1 bushels per acre) across 64 trials.

Preliminary Findings on Yield 2018-2023

- We have yet to find a correlation between MoA and yield response.
- Weather conditions shortly after application may influence yield response. (Increase in rainfall and average air temperatures with 2 days of application have a positive trend with yield response.)



Disease Ratings: 2018 to 2023

Background on fungicide applications in soybean:

- ~10% of Missouri soybean fields scouted prior to an application
- $\geq 65\%$ of soybean fields receive an R3 fungicide application
- Preventative spraying is mostly for frogeye leaf spot

2024 in-person surveys of Missouri agriculture professionals



Disease Ratings: Summary 2018 to 2023

Scout Summary: Disease rating (0 to 100)

Year	Disease	n	Pre ¹	Post No Spray	Post Spray
2018	Septoria	8/8	3.1	5.3	4.2
	Frogeye	7/8	0.005	0.97	2.2
2019	Septoria	11/11	0.95	2.5	2.0
	Frogeye	4/11	0.02	0.01	0.01
2020	Septoria	10/10	4.1	4.7	4.6
	Downy	3/10	1.0	1.0	1.0
2021	Septoria	10/10	5.7	7.4	7.4
	Downy	5/10	0.12	0.27	0.26
2022	Septoria	9/9	3.2	8.5	8.4
	Downy	3/9	0	0.7	0.7



We observed very little frogeye leaf spot pressure across the state.

Septoria Brown Spot was the most common disease observed. This disease does not typically result in yield losses.

¹ Mean of sites with disease that year.

R3 Fungicide for Soybean: Variety details 2018 to 2023

ID	County	Strips	Planting Date	Variety	RM	FLS	SDS	RW	Irr.
1801	Ralls	7	4/26/18	Stine 41LF32 LL	4.1	2	1	15	N
1802	Barton	10	5/31/18	P44T63R	4.4	-	-	30	Y
1803	Polk	12	6/6/18	Stine 50LF32	5.0	2	4.5	75	N
1805W	Nodaway	11	5/9/18	AG39X7	3.9	6	3	15	N
1805E	Nodaway	11	5/9/18	AG40X6	4.0	NR	3	15	N
1806	Warren	12	5/5/18	Beck's 394L4	3.9	1	2	15	N
1807	Scott	10	6/12/18	Stine 44LH22 LL	4.4	2	4	7.5	N
1809	Holt	10	5/15/18	Momentum 38CO5	3.8	-	-	15	N
1810	Marion	12	5/8/18	Lewis 4372X	4.3	6	3	15	N
1811	Lincoln	12	5/26/18	Stine 42LH02	4.2	2	4	15	N
1901	Barton	12	6/14/19	Croplan RX4825	4.8	2	1	30	Y
1903	Greene	8	6/18/19	Pioneer P52A43L	5.2	4	3	7.5	N
1904	Holt	10	6/16/19	eMerge e3782S	3.7	2	2	15	N
1906	Lincoln	12	6/10/19	Becks 394L4	3.9	1	2	15	N
1908	Marion				-	-	-		N
1909	St. Clair	14	6/10/19	Pioneer 47A76L	4.7	2	4		N
1910	Buchanan	11	6/6/19	Pioneer P29A85L	2.9	-	-	15	N
1911	Perry	16	5/25/19		-	-	-	20	N
1913	Mississippi	11	5/28/19	Asgrow AG43X7	4.3	3	6		N
1914	Ralls	15	6/4/19	Stine 36EB02	3.6	9	NR		N

RM=Relative maturity; FLS=frogeye leaf spot; SDS=Sudden death syndrome; RW=row width; Irr.=Irrigated (yes/no); NR=not reported.

ID	County	Strips	Planting Date	Variety	RM	FLS	SDS	RW	Irr.
2001	Holt	12	5/20/20	Agventure AG34V4E	3.4	9	4.5	7.5	N
2002	Cape	14	6/8/20	Dyna-Gro 49EN79	4.9	2	4	15	N
2003	Montgomery	11	6/8/20	Pioneer 41T07E	4.1	5	2	15	N
2004	Warren	18	5/12/20	Stine 40GB20	4	9	3	15	N
2005	Franklin	15	5/18/20	Agventure 40V7E	4	4.5	2	7.5	N
2006	Lincoln	10	5/11/20	Becks 4442	4.4	2	NR	15	N
2007	Audrain	8	6/16/20	Becks 3510E3	3.5	NR	3	8	N
2008	Dade	12	6/6/20	9950 Willcross Conv	5	2	2	15	N
2009	Scott	11	6/14/20	GS463E20S	-	-	-	8	N
2010	Perry	14	6/25/20	Gateway 483	4.2	-	-	20	N
2101	Cape	17	5/25/21	AgriGold 482ORX	4.8	6	4	15	N
2102	Dade	9	6/4/21	9950 Willcross Conv	5.0	2	2	15	N
2103	Audrain	10	7/??/21						N
2104	Holt	11	5/7/21	Agventure AG34V4E	3.4	9	4.5	7.5	N
2105H	Stoddard	17	4/??/21	Asgrow 46X6	4.6	4	6	36	N
2105L	Stoddard	17	4/??/21	Asgrow 46XF0	4.5	3	6	36	N
2106	Montgomery	10	5/??/21					7.5	N
2107	Buchanan	11	5/7/21	Pioneer 30T99E	3.0	3	5	15	N
2108	Benton	11	6/7/21	GH 3934X	3.9	7	9	27	N
2109	Franklin	12							N
2111	Macon	10	6/9/21	GH 3922 E3PS	3.9	3	3	15	N

R3 Fungicide for Soybean: Fungicide details 2018 to 2023

ID	Spray Date	Fungicide	Rate (oz./A)	Group	MOA	ID	Spray Date	Fungicide	Rate (oz./A)	Group	MOA
1801	7/19/18	Cover XL	10.5	3, 11	DMI+QoI	2001	7/19/20	Aframe Plus	20.9	3, 11	DMI+QoI
1802	7/25/18	Fortix	5.0	3, 11	DMI+QoI	2002	8/18/20	TopGuard EQ	5.0	3, 11	DMI+QoI
1803	8/29/18	Onset	4.0	3	DMI	2003	8/20/20	Radius	7.0	3, 11	DMI+QoI
1805	7/24/18	Aframe Plus	10.5	3, 11	DMI+QoI	2004	8/7/20	Miravis Top	12.8	3, 7	DMI+SDHI
1806	8/1/18	Priaxor	4.0	7, 11	SDHI+QoI	2005	7/24/20	Quilt Xcel	15.0	3, 11	DMI+QoI
1807	8/14/18	Azoxypop	10.0	3, 11	DMI+QoI	2006	8/6/20	Delaro	8.0	3, 11	DMI+QoI
1809	7/23/18	Aframe Plus	15.6	3, 11	DMI+QoI	2007	8/19/20	Priaxor	8.0	7, 11	SDHI+QoI
1810	7/10/18	Trivapro	13.7	3, 7, 11	DMI+SDHI+QoI	2008	8/19/20	Stratego	4.0	3, 11	DMI+QoI
1811	7/17/18	Trivapro	13.7	3, 7, 11	DMI+SDHI+QoI	2009	8/18/20	Cover XL	10.0	3, 11	DMI+QoI
1901	8/1/19*	Fortix	5.0	3, 11	DMI+QoI	2010	8/10/20	Cover XL	12.8	3, 11	DMI+QoI
1903	8/29/19	Headline Amp	10.0	3, 11	DMI+QoI	2101	7/17/21	Radius ESQ	7.0	3, 11	DMI+QoI
1904	8/7/19	Aframe Plus	16.0	3, 11	DMI+QoI	2102	7/23/21	Priaxor Xemium	8.0	7, 11	SDHI+QoI
1906	8/10/19	Delaro 325SC	5.0	3, 11	DMI+QoI	2103	9/9/21	Approach Prima		3, 11	DMI+QoI
1908	8/15/19		4.0	7, 11	SDHI+QoI	2104	7/30/21	Lucento	5.5	3, 7	DMI+SDHI
1909	8/14/19	Delaro 325SC	8.0	3, 11	DMI+QoI	2105	7/17/21	Miravis Top	13.7	3, 7	DMI+SDHI
1910	7/19/19*	Fortix	4.0	3, 11	DMI+QoI	2106	8/9/21	Miravis Top	12.8	3, 7	DMI+SDHI
1911	8/11/19	Cover XL	12.8	3, 11	DMI+QoI	2107	7/23/21	Miravis Top	13.7	3, 7	DMI+SDHI
1913	8/13/19	Trivapro	10.0	3, 7, 11	DMI+SDHI+QoI	2108	8/16/21	Approach Prima	6.8	3, 11	DMI+QoI
1914	8/16/19	Stratego YLD	15.6	3, 11	DMI+QoI	2109	7/29/21	Trivapro		3, 11	DMI+QoI
						2111	8/18/21	Radius ESQ	6.4	3, 11	DMI+QoI

MOA=mode of action.

R3 Fungicide for Soybean: Scouting Results 2018 to 2023

Location ID	County	Delta Yield (bu/A)	Septoria			Frog Eye			Downy Mildew			Sudden Death Syndrome		
			Pre	Post No Spray	Post Spray	Pre	Post No Spray	Post Spray	Pre	Post No Spray	Post Spray	Pre	Post No Spray	Post Spray
1801	Ralls	-2.9	1.9	6.3	5.3									
1802	Barton	5.6	3.4	1.3	0.7	<0.1	0	0						
1803	Polk	-1.0	10	13.4	10.8	0	1.8	0.8						
1805W	Nodaway	4.7	-	-	-	-	-	-	-	-	-	-	-	-
1805E	Nodaway	1.5	-	-	-	-	-	-	-	-	-	-	-	-
1806	Warren	-1.3	6.1	4.3	2.9	0	0.3	0.03						
1807	Scott	4.2	0.6	1.0	1.1	<0.01	0.02	0.04						
1809	Holt	2.9	0.2	2.5	4.2	0.01	4.7	14.4						
1810	Marion	0.5	2.3	4.4	2.8	0	0.02	0.02						
1811	Lincoln	4.1	0.5	9.4	6.2	0.03	0	0						
1901	Barton	3.2	0.1	1.0	0.7	0	<0.01	0						
1903	Greene	-0.4	0.2	3.0	2.0	0	0.01	0.01						
1904	Holt	1.2	0.1	3.9	3.3									
1906	Lincoln	2.0	0.4	3.0	2.8									
1908	Marion	1.7	0.7	1.2	0.8									
1909	St. Clair	0.5	3.5	3.5	3.2									
1910	Buchanan	0.9	<0.1	1.4	2.6									
1911	Perry	-2.4	1.0	3.1	3.0	0.08	0.03	0.01						
1913	Mississippi	-0.2	4.3	3.9	1.9	0	0	0.02						
1914H	Ralls	3.7	<0.1	3.7	2.0									
1914L	Ralls	1.2	0.1	0.05	0.01									
2001	Holt	4.3	3.2	4.8	4.8	0	0.9	0.8				0	1.0	1.4
2002	Cape	1.7	4.8	4.8	4.8							0	6.2	4.8
2003	Montgomery	0.3	4.8	4.8	4.8				1.0	1.0	1.0			
2004W	Warren	2.4	-	-	-	-	-	-	-	-	-	-	-	-
2004E	Warren	4.6	3.0	6.7	6.7							0	64.3	63.7
2005	Franklin	0.1	3.8	4.8	4.8							0	1.1	0.7
2006	Lincoln	12.5	5.4	6.5	6.3							0	32.6	33.6
2007	Audrain	0.7	0.4	2.6	2.6				1.0	1.0	1.0			
2008	Dade	0.2	9.0	5.2	4.8									
2009	Scott	1.1	4.8	4.8	4.8							0	0.6	0.04
2010	Perry	0.4	2.3	1.9	1.9				1.0	1.0	1.0			

All numbers are reported as “disease index” on a scale of 0 to 100.

Disease index is calculated as the incidence (%) times the severity (0 to 100).

An index value >25% is high. A value >50% is very high.

R3 Fungicide for Soybean: Scouting Results 2018 and 2023 continued

Location ID	County	Delta Yield (bu/A)	Septoria			Frog Eye			Downy Mildew			Sudden Death Syndrome		
			Pre	Post No Spray	Post Spray	Pre	Post No Spray	Post Spray	Pre	Post No Spray	Post Spray	Pre	Post No Spray	Post Spray
2101	Cape	4.4	0.8	8.9	9.3				0	0.4	0.4			
2102	Dade	-2.3	9.4	9.5	9.0									
2103	Audrain	1.5	2.2	3.1	2.6									
2104	Holt	1.6	10.7	5.3	5.9									
2105H	Stoddard	1.5	3.4	4.5	4.5									
2105L	Stoddard	1.3	-	-	-	-	-	-	-	-	-	-	-	-
2106	Montgomery	-0.5	2.2	9.5	9.5				0	0.3	0.3			
2107	Buchanan	3.2	9.5	9.5	9.5				0	0.2	0.2			
2108	Benton	1.0	4.5	4.8	4.8				0.3	0.1	0.1			
2109	Franklin	0.7	9.5	9.5	9.5				0.4	0.3	0.3			
2111	Macon	0.8	4.9	9.5	9.1									
2201	Holt	0.93	1.1	11.1	10.6									
2202	Buchanan	4.12	7.0	17.7	17.2									
2203	Cape	-0.14	1.8	1.8	1.8				0	1.8	1.8			
2205	Dade	-0.15	1.9	3.8	3.8									
2207IH	Mississippi	0.96	1.9	9.9	9.9									
2208	Montgomery	-1.20	2.6	1.9	1.9				0	0.2	0.3			
2209	Marion	2.35	3.2	6.8	6.8									
2213	Ralls	-0.39	2.8	19.4	18.9				0	0.1	0.1			
2214	Pike	-0.75	6.3	6.8	7.2									
2301	Holt	-0.44	2.1	17.6	17.6									
2302	Buchanan	2.37	4.8	9.5	9.5									
2303	Andrew	4.64	1.9	9.5	9.0									
2304	New Madrid	4.74	11.8	5.1	4.9									
2305	Cape	2.09	2.8	8.8	8.4									
2306	Pike	4.48	9.4	17.6	16.8									
2307	Audrain													
2309	Lincoln	3.01	1.8	2.3	2.5									
2310	Lincoln	2.63	2.1	1.6	1.5									
2311	Montgomery	4.53	-	-	-									

All numbers are reported as “disease index” on a scale of 0 to 100.

Disease index is calculated as the incidence (%) times the severity (0 to 100).

An index value >25% is high. A value >50% is very high.

**Check with your regional
MU Extension Field Specialist
about scouting schools in 2024.**

