


Improving management of white mold in soybeans and dry beans: Optimizing fungicide application timing

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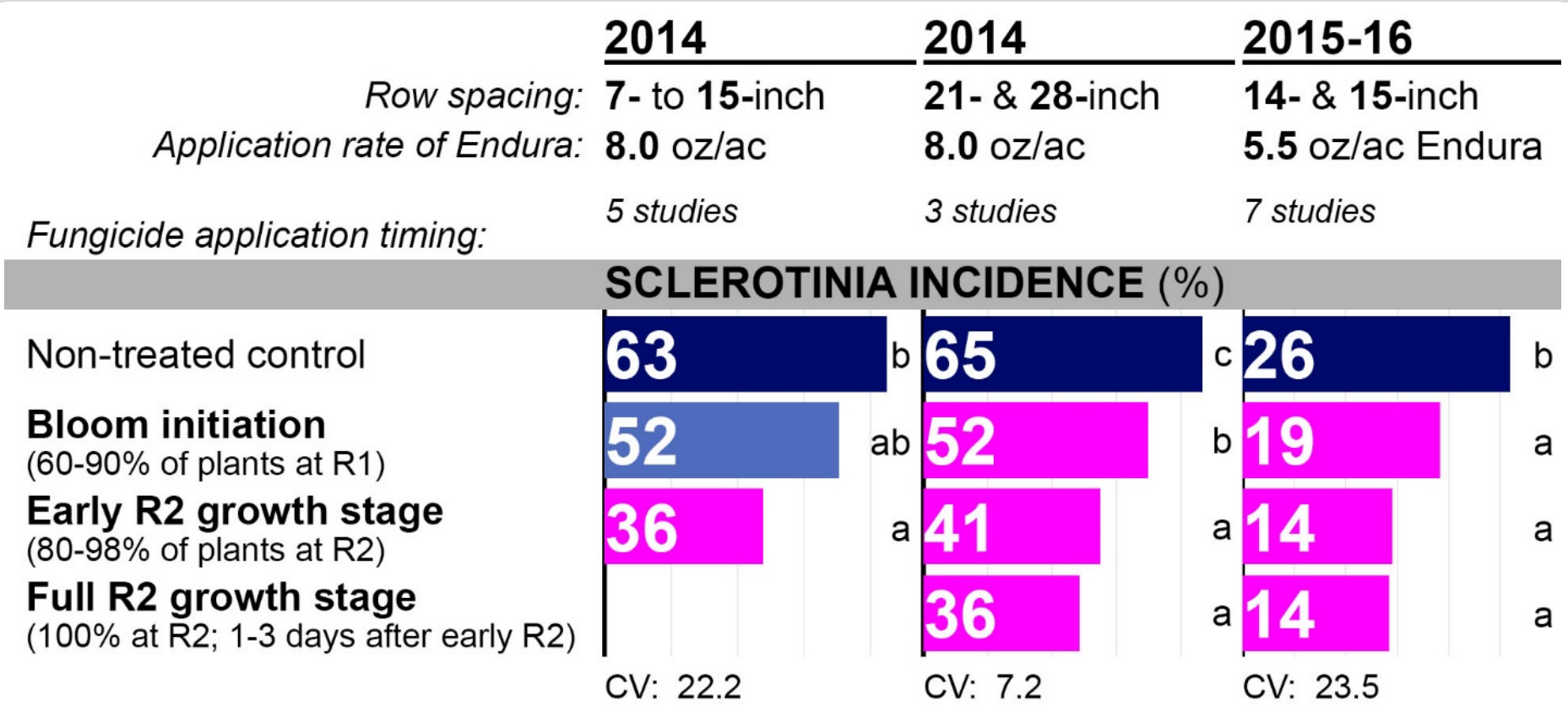
Optimizing application timing – Single fungicide application

Carrington, Hofflund, Langdon, and Oakes ND (2014-2016)

Combined analysis across 15 field studies

Fungicide applied: Endura at 5.5 or 8.0 oz/ac



Nozzles: XR8001 or XR80015 flat-fan TeeJet nozzles, 35 or 40 psi (droplet size = fine)
Spray volume: 15 or 17.5 gal/ac

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

North Dakota Soybean Council
Our World Is Growing.

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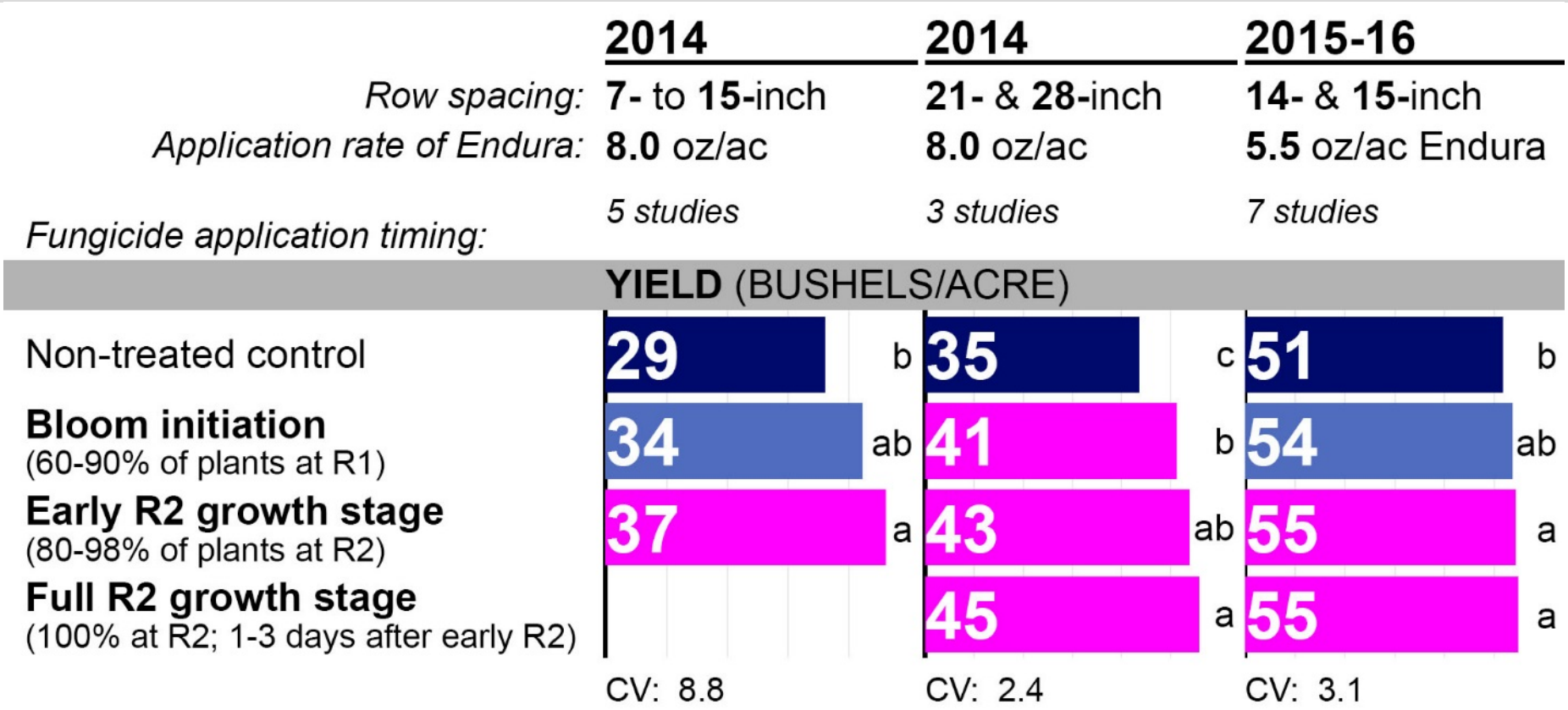

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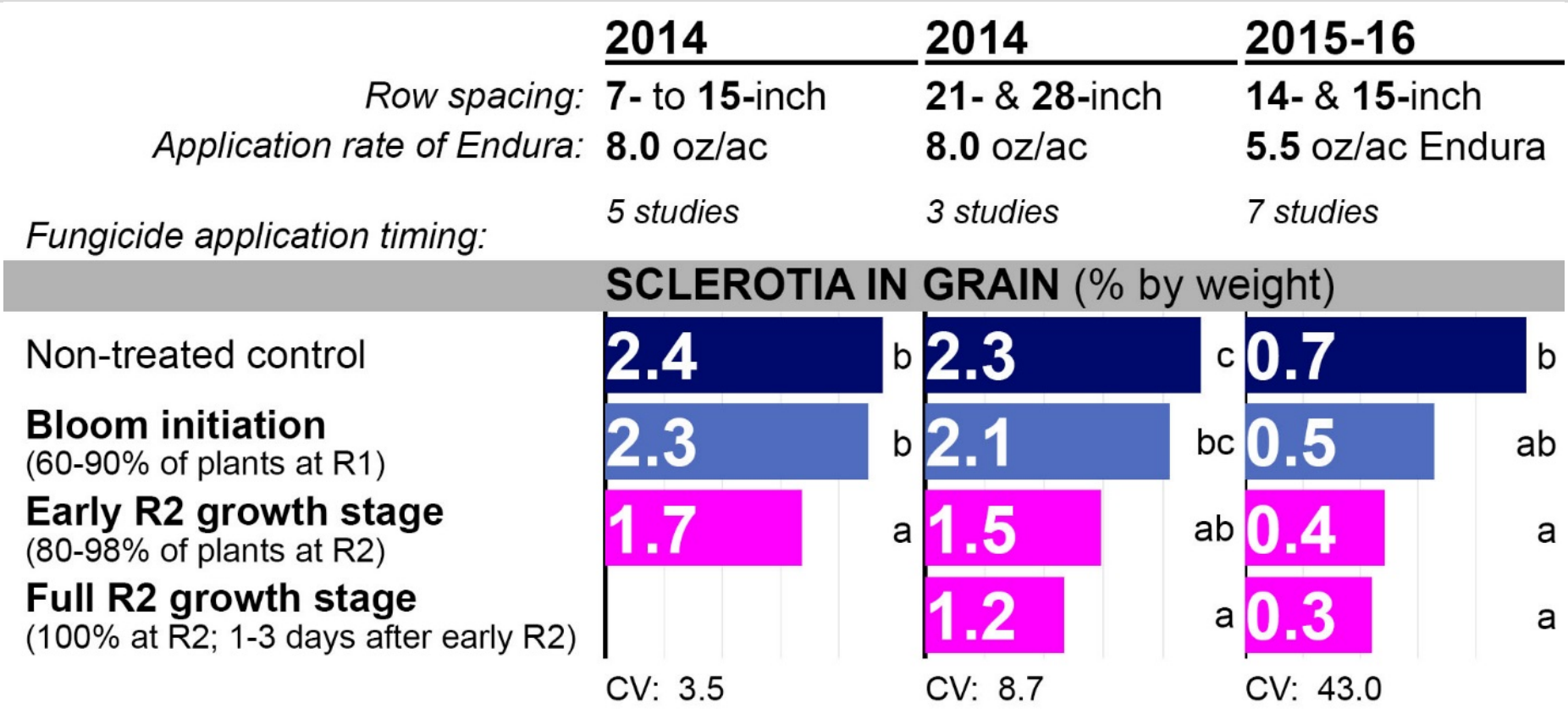

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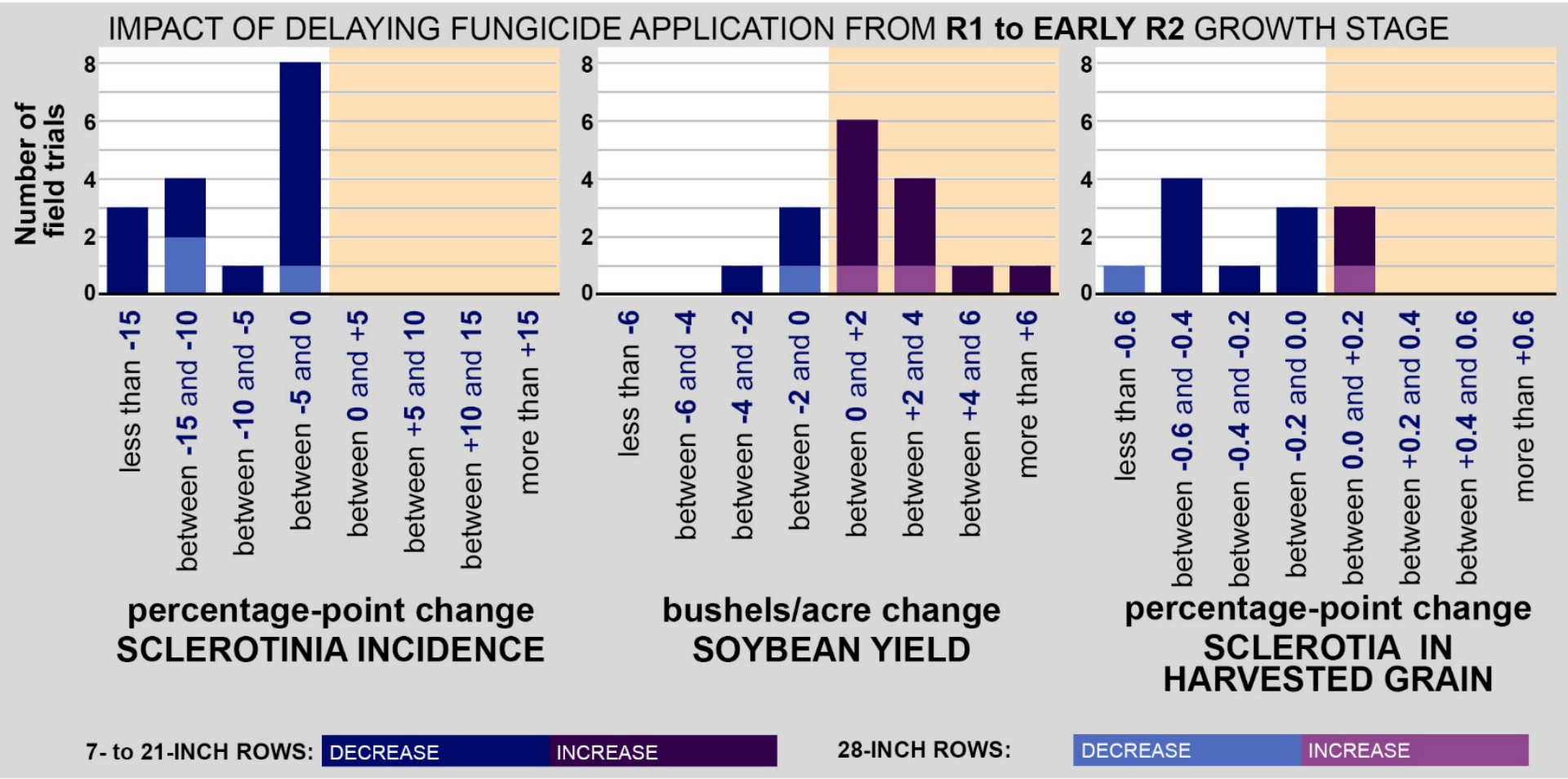
Carrington, Hofflund, Langdon, and Oakes ND (2014-2016)

Combined analysis across 16 field studies

Fungicide applied: Endura at 5.5 or 8.0 oz/ac



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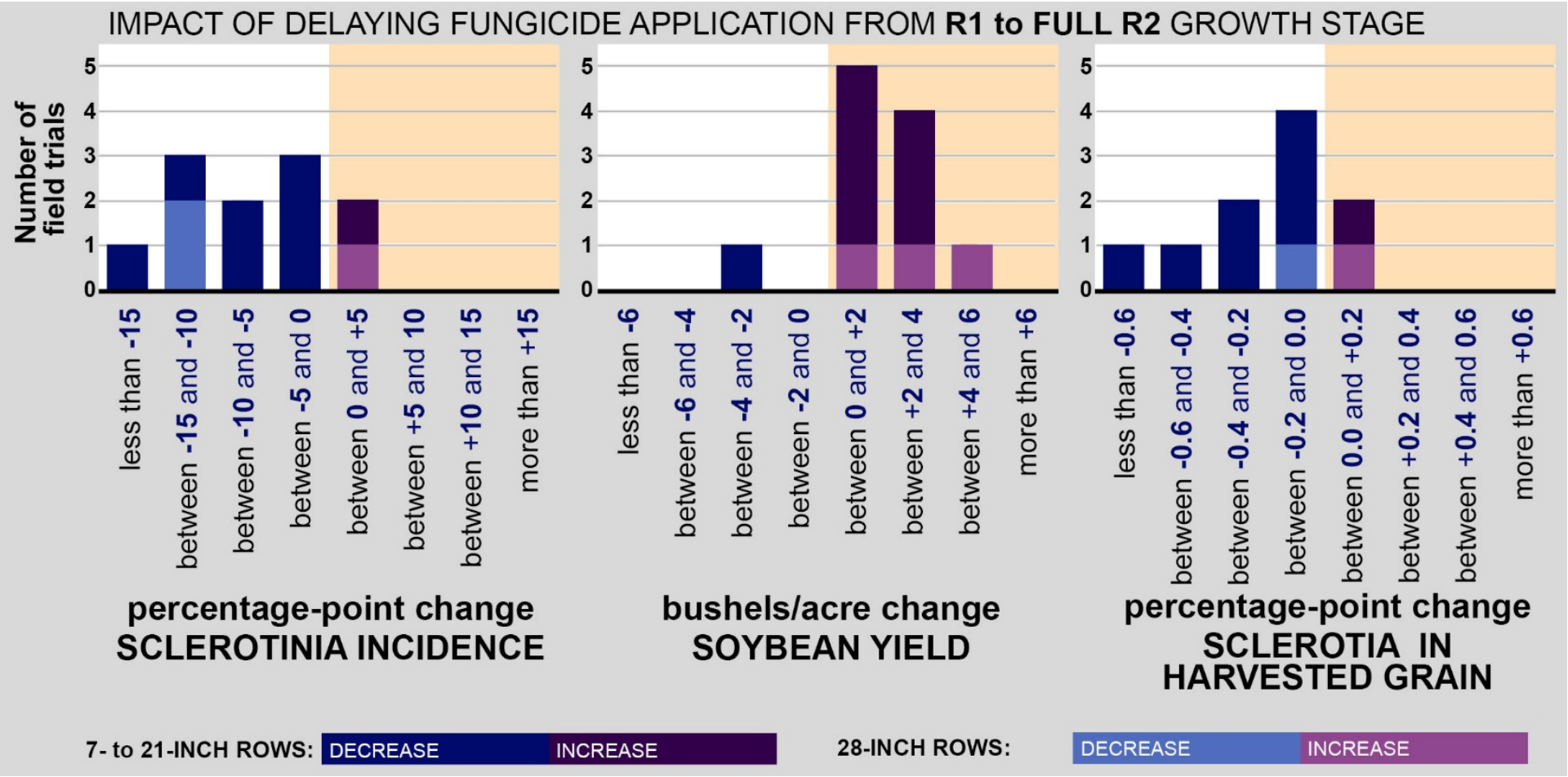
Spray volume: 15 or 17.5 gal/ac

Optimizing application timing – Single fungicide application

Carrington, Hofflund, Langdon, and Oakes ND (2014-2016)

Combined analysis across 11 field studies

Fungicide applied: Endura at 5.5 or 8.0 oz/ac



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Spray volume: 15 or 17.5 gal/ac

Optimizing application timing – Single fungicide application

Oakes, ND (2017)

‘Eclipse’ black beans

14-inch row spacing

	FIRST FUNGICIDE APPLICATION:			White Mold	Sclerotia	Yield
Fungicide Timing	**Percent Bloom**	**Pod Length**	**Canopy Closure**	late R7 / early R8 growth stage **% of canopy diseased**	contamination in grain **Percent by weight**	13.5% moisture **Pounds/acre**
Application dates	plants with open blossom	maximum length (inch)	% of ground covered			
Non-treated control				74 d	1.2 d	2897 d
July 22	**68%**	-	75-95%	64 cd	1.0 d	3197 cd
July 24	**100%**	-	75-100%	56 bc	0.8 cd	3509 bc
July 26	**100%**	**0.5”**	85-100%	49 ab	0.7 bc	3924 ab
July 28	**100%**	**1.0”**	95-100%	42 a	0.5 ab	4122 a
				CV: 21.1	CV: 34.1	CV: 11.8

Fungicide applied: Topsin 4.5FL 30 fl oz/ac
Nozzles: XR110015 flat-fan TeeJet nozzles, 35 psi (droplet size = fine)
Spray volume: 15 gal/ac

Optimizing application timing – Two fungicide applications

Oakes, ND (2017)

‘Eclipse’ black beans

14-inch row spacing

Fungicide Timing Application dates	FIRST FUNGICIDE APPLICATION: Percent Bloom plants with open blossom	Pod Length maximum length (inch)	Canopy Closure % of ground covered	White Mold late R7 / early R8 growth stage **% of canopy diseased**	Sclerotia contamination in grain **Percent by weight**	Yield 13.5% moisture **Pounds/acre**
Non-treated control				74 c	1.2 b	2897 b
July 22, Aug. 3	**68%**	**-**	75-95%	42 b	0.5 a	3943 a
July 24, Aug. 5	**100%**	**-**	75-100%	39 ab	0.5 a	4302 a
July 26, Aug. 7	**100%**	**0.5”**	85-100%	28 a	0.3 a	4441 a
July 26, Aug. 8	**100%**	**1.0”**	95-100%	36 ab	0.4 a	4184 a
				CV: 21.1	CV: 34.1	CV: 11.8

Fungicide applied: Topsin 4.5FL 30 fl oz/ac *followed by* Endura 70WG 8 oz/ac
Nozzles: XR110015 flat-fan TeeJet nozzles, 35 psi (droplet size = fine)
Spray volume: 15 gal/ac

Optimizing application timing – Single fungicide application

Carrington, ND (2017)

‘Lariat’ pinto beans

14-inch row spacing

Fungicide Timing (Application dates)	FIRST FUNGICIDE APPLICATION: Percent Bloom (plants with open blossom)	Pod Length (maximum length (inch))	Canopy Closure (% of ground covered)	White Mold (late R7 / early R8 growth stage, % of canopy diseased)		Sclerotia (contamination in grain, Percent by weight)		Yield (13.5% moisture, Pounds/acre)	
Non-treated control				83	a	4.2	c	1285	b
July 20	**80%**	**-**	95%	85	a	4.1	bc	1209	b
July 22	**100%**	**1.0”**	99%	75	a	2.4	a	1908	a
July 25	**100%**	**3.0”**	100%	77	a	2.9	a	1864	a
July 27	**100%**	**4.0”**	100%	75	a	3.0	ab	1671	ab
				CV: 11.5		CV: 32.3		CV: 25.9	

Fungicide applied: Topsin 4.5FL 30 fl oz/ac
Nozzles: DGXR80015 flat-fan TeeJet nozzles, 35 psi (droplet size = medium)
Spray volume: 15 gal/ac

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SPECIALTY CROP BLOCK GRANT PROGRAM

Optimizing application timing – Two fungicide applications

Carrington, ND (2017)

‘Lariat’ pinto beans

14-inch row spacing

Fungicide Timing (Application dates)	FIRST FUNGICIDE APPLICATION: Percent Bloom (plants with open blossom)	Pod Length (maximum length (inch))	Canopy Closure (% of ground covered)	White Mold (late R7 / early R8 growth stage, % of canopy diseased)	Sclerotia (contamination in grain, Percent by weight)	Yield (13.5% moisture, Pounds/acre)
Non-treated control				83 b	4.2 b	1285 b
July 20, Aug. 1	**80%**	**-**	95%	75 ab	2.9 a	1719 ab
July 22, Aug. 3	**100%**	**1.0”**	99%	70 a	2.2 a	2163 a
July 25, Aug. 6	**100%**	**3.0”**	100%	70 a	2.4 a	1974 a
July 27, Aug. 8	**100%**	**4.0”**	100%	77 ab	2.5 a	1729 ab
				CV: 11.5	CV: 32.3	CV: 25.9

Fungicide applied: Topsin 4.5FL 30 fl oz/ac *followed by* Endura 70WG 8 oz/ac
Nozzles: DGXR80015 flat-fan TeeJet nozzles, 35 psi (droplet size = medium)
Spray volume: 15 gal/ac

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Optimizing application timing – Single fungicide application

Carrington, ND (2017)

‘Lariat’ pinto beans

WIDE ROWS: 28-inch row spacing

Fungicide Timing (Application dates)	FIRST FUNGICIDE APPLICATION: Percent Bloom (plants with open blossom)	Pod Length (maximum length (inch))	Canopy Closure (% of ground covered)	White Mold (late R7 / early R8 growth stage, % of canopy diseased)		Sclerotia (contamination in grain, Percent by weight)		Yield (13.5% moisture, Pounds/acre)	
Non-treated control				86	a	3.9	a	1297	a
July 20	**80%**	**-**	70%	88	a	4.4	a	1215	a
July 22	**100%**	**1.0”**	95%	80	a	3.1	a	1739	a
July 25	**100%**	**3.0”**	98%	81	a	3.2	a	1595	a
July 27	**100%**	**4.0”**	100%	80	a	3.0	a	1691	a
				CV: 9.8		CV: 34.2		CV: 24.2	

Fungicide applied: Topsin 4.5FL 30 fl oz/ac
Nozzles: DGXR80015 flat-fan TeeJet nozzles, 35 psi (droplet size = medium)
Spray volume: 15 gal/ac

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Carrington, ND (2017)

‘Lariat’ pinto beans

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Non-treated control				86 b	3.9 b	1297 b
July 20, Aug. 1	**80%**	**-**	70%	79 ab	2.8 ab	1686 b
July 22, Aug. 3	**100%**	**1.0”**	95%	74 a	2.2 a	2158 a
July 25, Aug. 6	**100%**	**3.0”**	98%	74 a	2.4 a	1997 a
July 27, Aug. 8	**100%**	**4.0”**	100%	78 ab	2.4 a	1825 a
				CV: 9.8	CV: 34.2	CV: 24.2

Fungicide applied: Topsin 4.5FL 30 fl oz/ac *followed by* Endura 70WG 8 oz/ac
Nozzles: DGXR80015 flat-fan TeeJet nozzles, 35 psi (droplet size = medium)
Spray volume: 15 gal/ac

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Optimizing application timing

Black beans and **pinto beans:**

When conditions favored white mold as dry beans entered bloom, white mold control and dry bean yield under white mold pressure were maximized when fungicides were applied when **100% of plants had an open blossom** and **first pin-pods were 0.5 to 1.0 inch long.**

Optimizing application timing

Soybeans:

When conditions favored white mold as soybeans entered bloom, white mold control and soybean yield under white mold pressure were maximized when fungicides were applied at **early to full R2 growth stage (80 to 100% of plants at R2 growth stage).**

R2 growth stage:
at least one open blossom at one of the top two nodes of the plant.

Fungicide residual

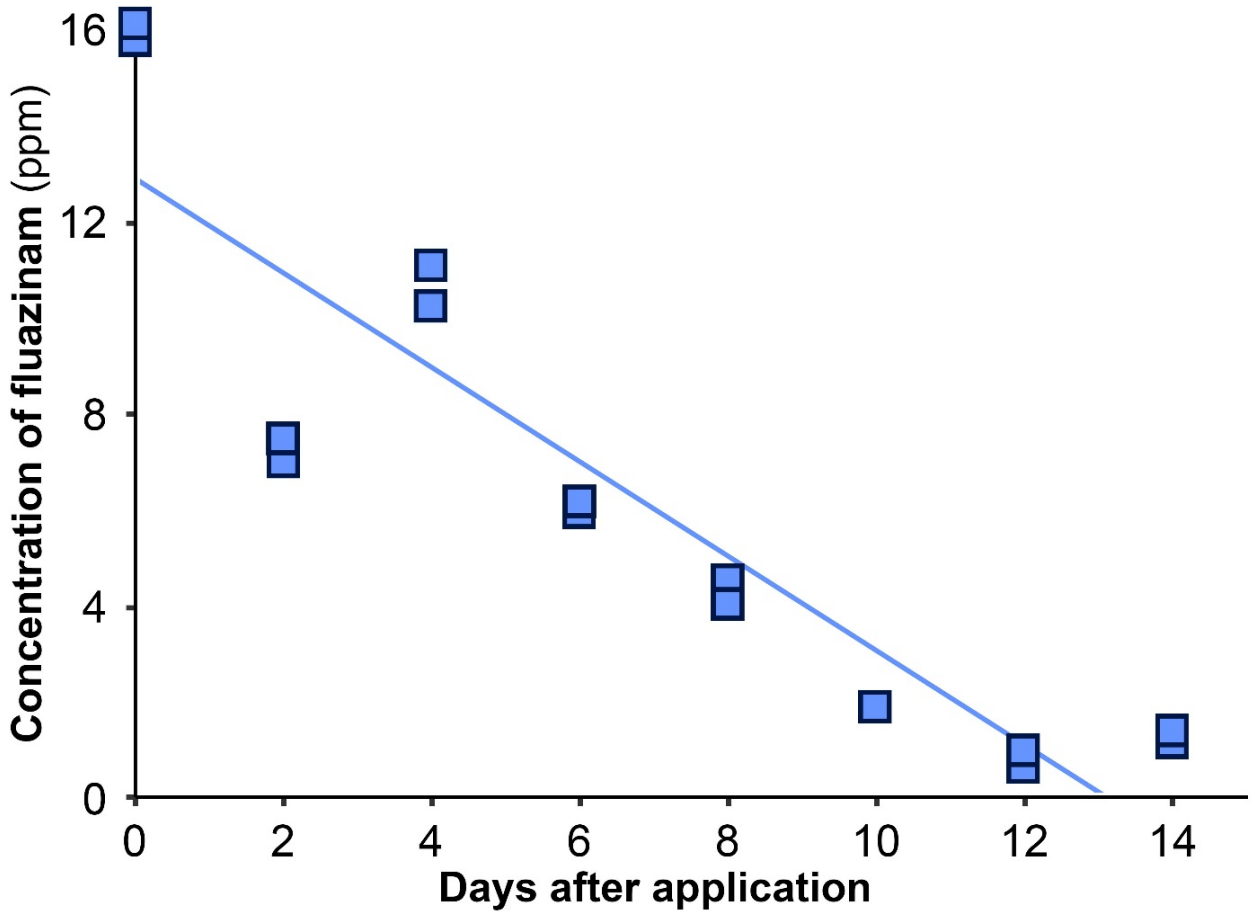
The concentration of fungicide active ingredient declines with time.

Causes: (1) New plant growth that received little or no fungicide
(2) Degradation of the active ingredient

DATA FROM SOYBEANS
Pereiras, Brazil (2014)

Fungicide applied:
Omega 500F 0.85

Miorini et al., unpublished



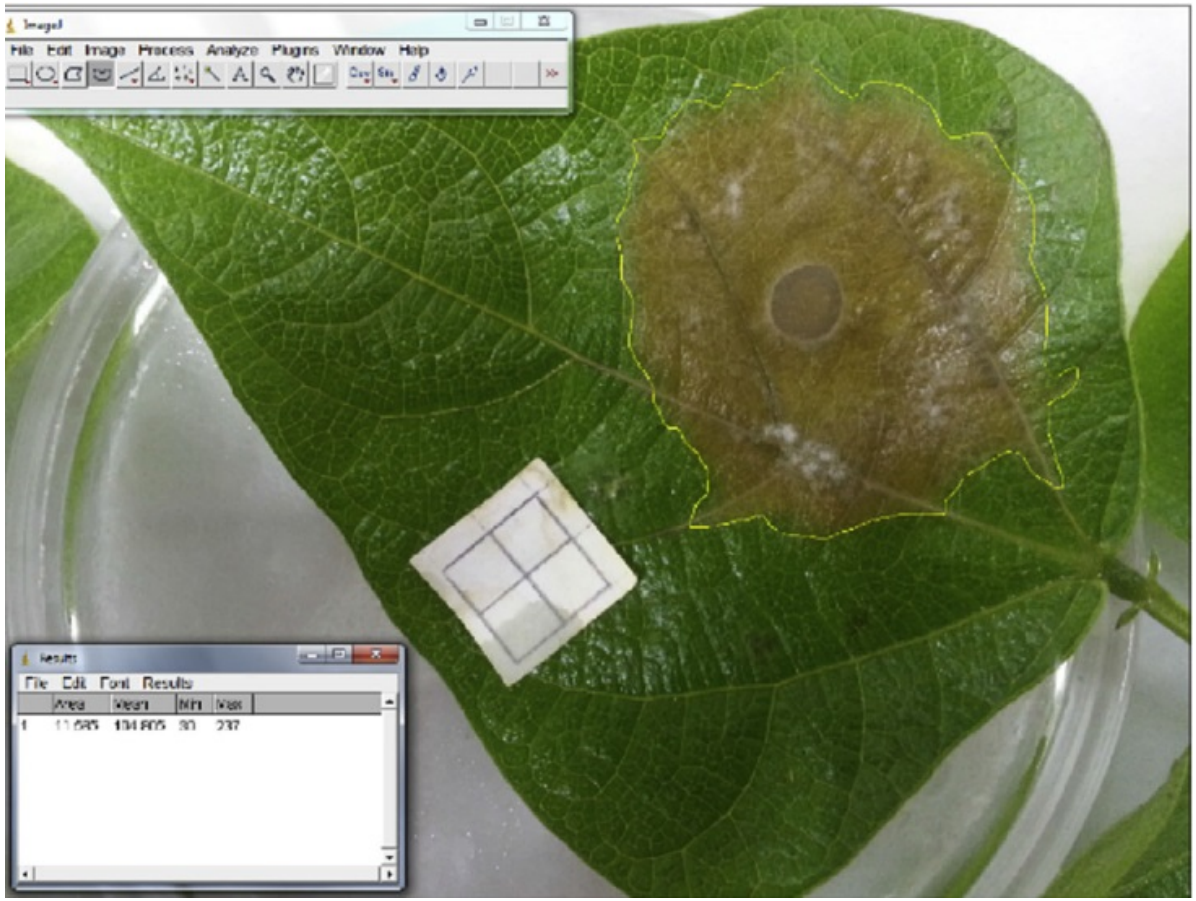
Fungicide residual

The concentration of fungicide active ingredient declines with time.

Causes: (1) New plant growth that received little or no fungicide
(2) Degradation of the active ingredient

DATA FROM DRY BEANS
Pereiras, Brazil (2014)

Miorini et al. (2017). Crop Protection 94:192-202



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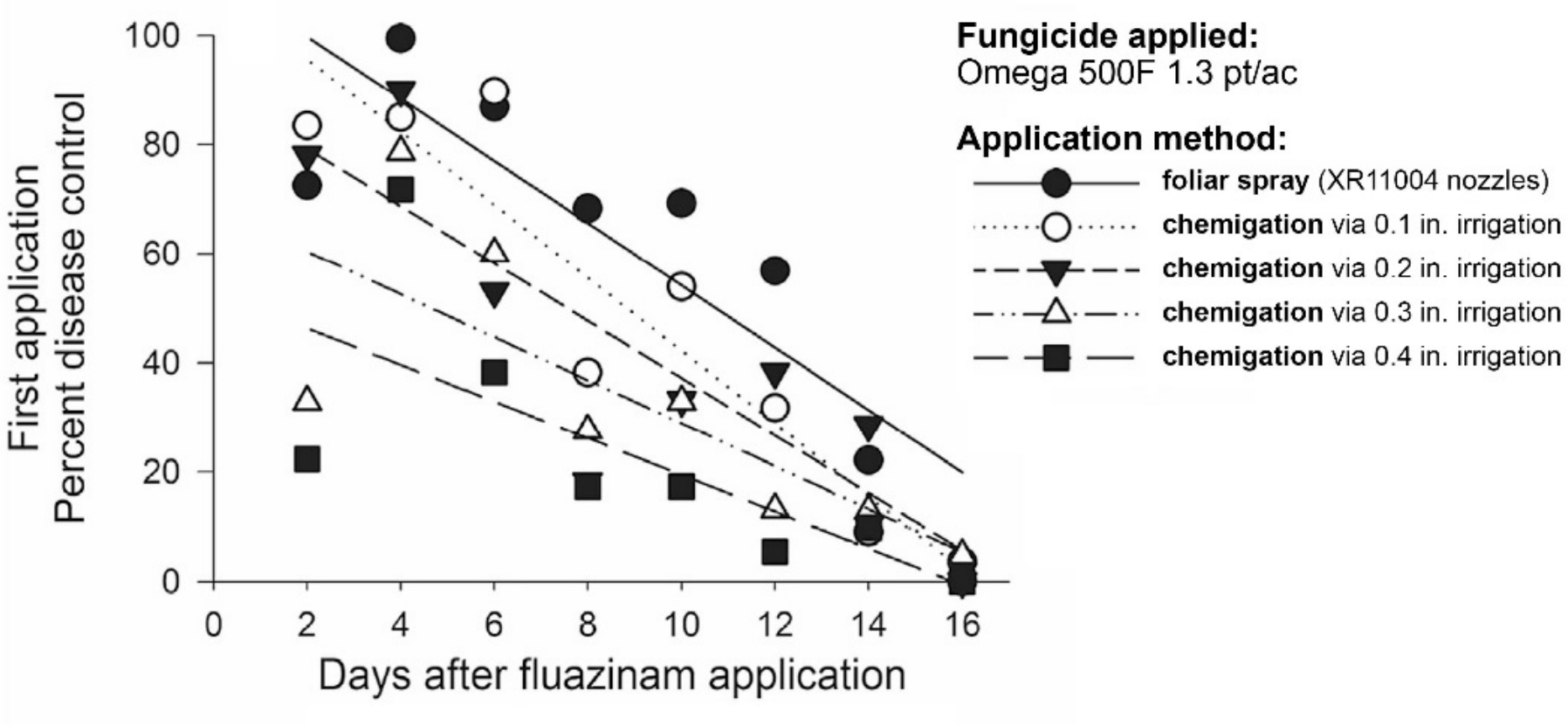

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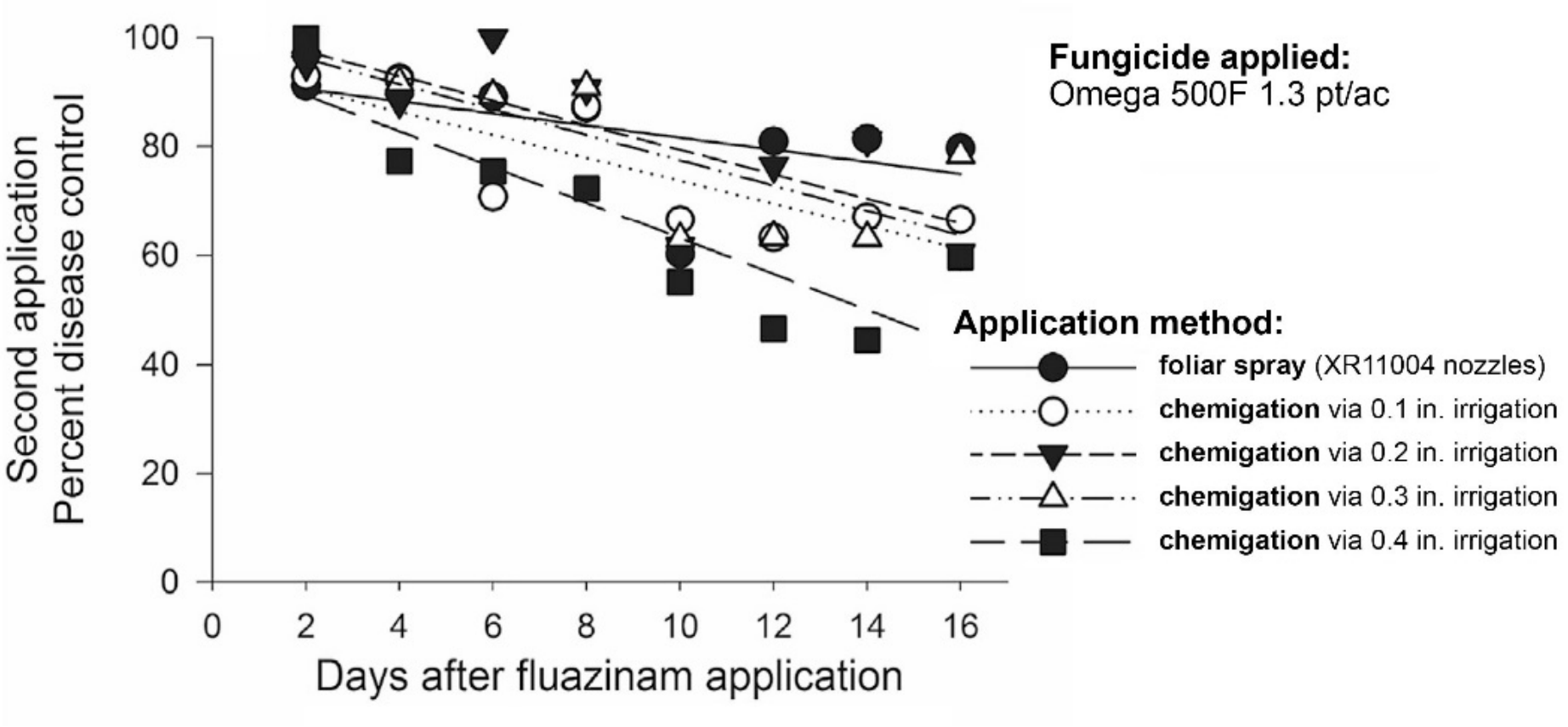




Thank You!

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North Dakota Soybean Council
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North Dakota Crop Protection Product Registration and Harmonization Board

NORTHARVEST BEANS

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