Soybean Disease Management Update

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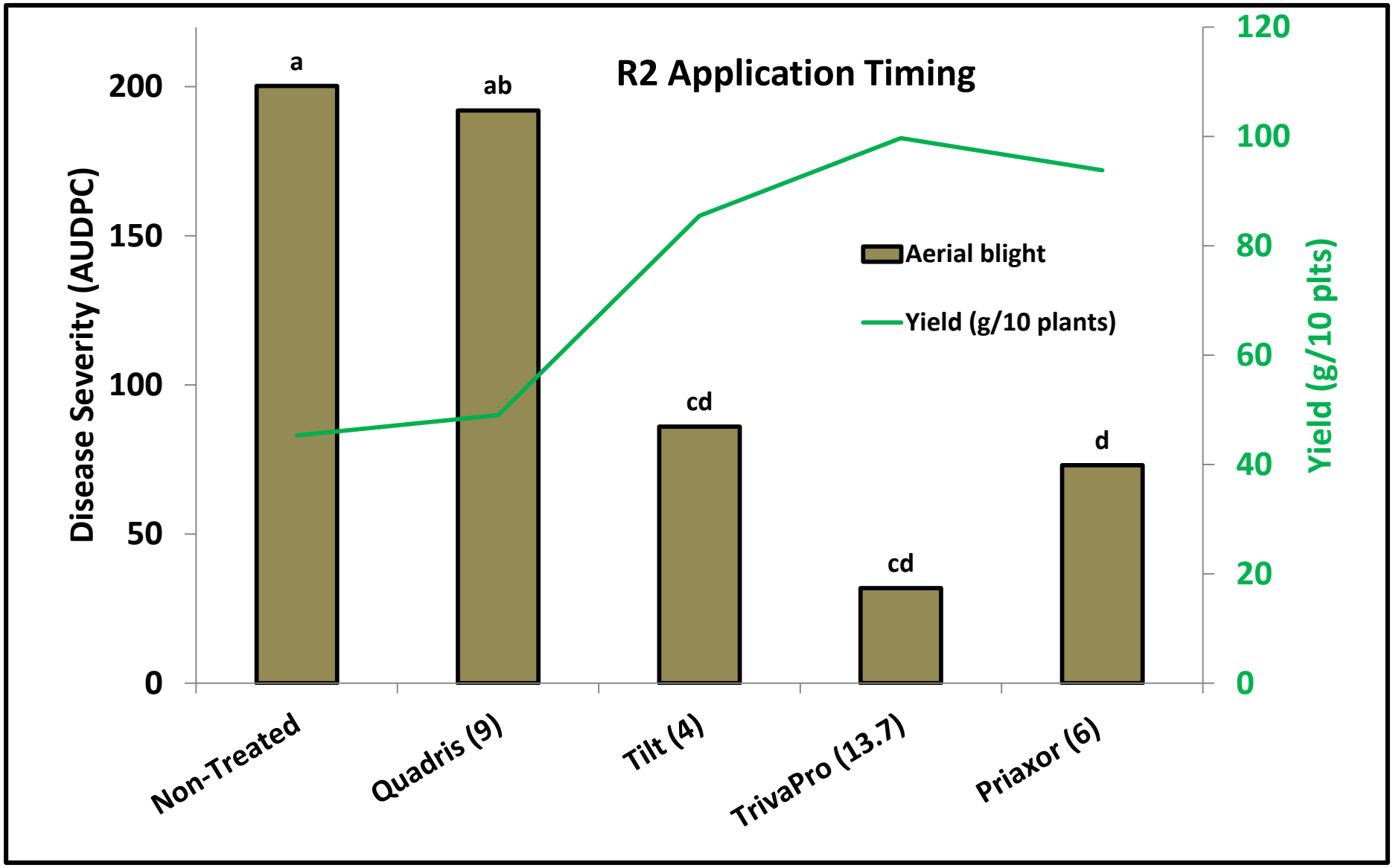
On-farm trials – 2018

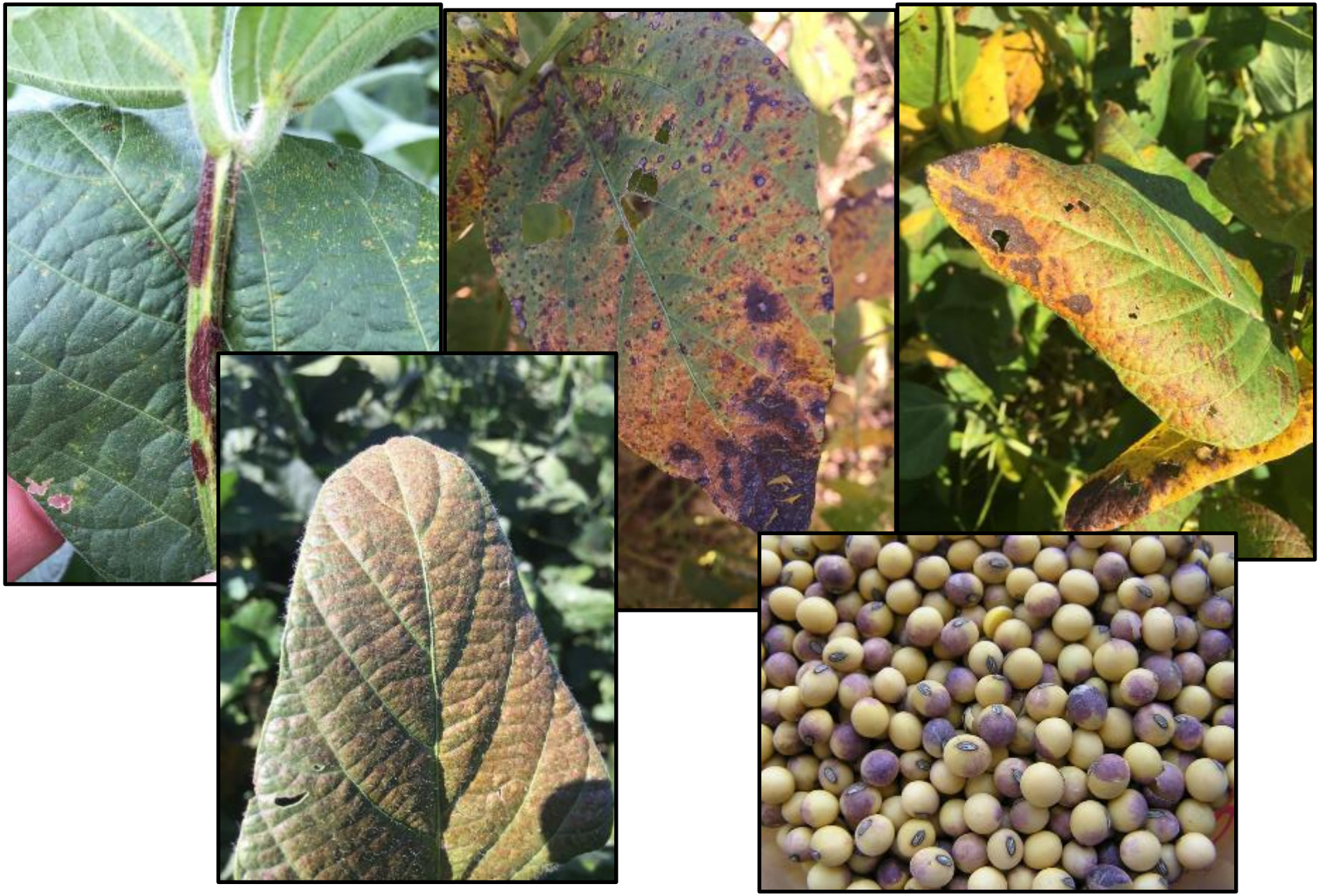
Thanks to Jeremy Hebert and Boyd Padgett

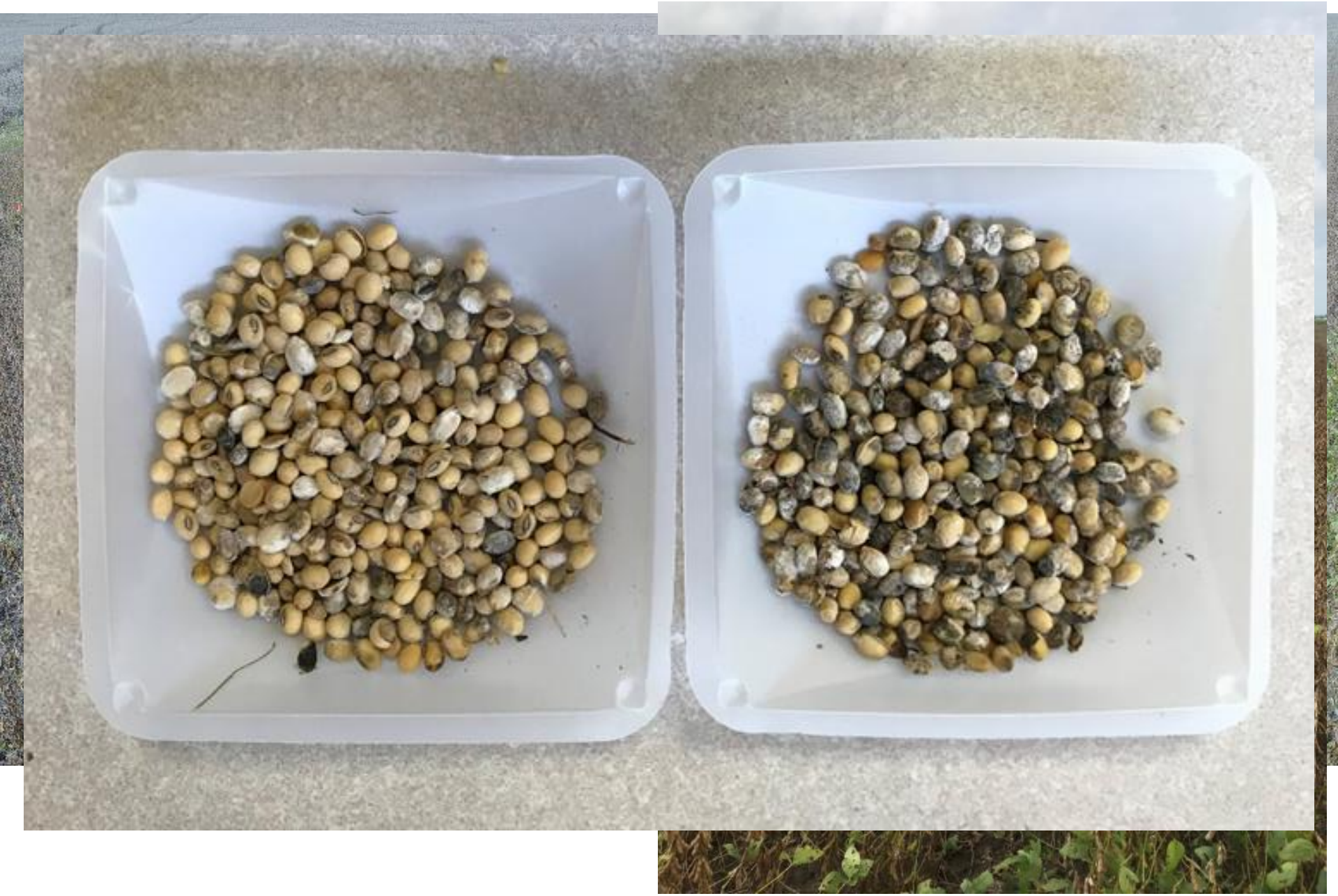
Effect of commercial fungicide application on aerial blight and yield – QoI–resistant location, 2016.

MROS1601

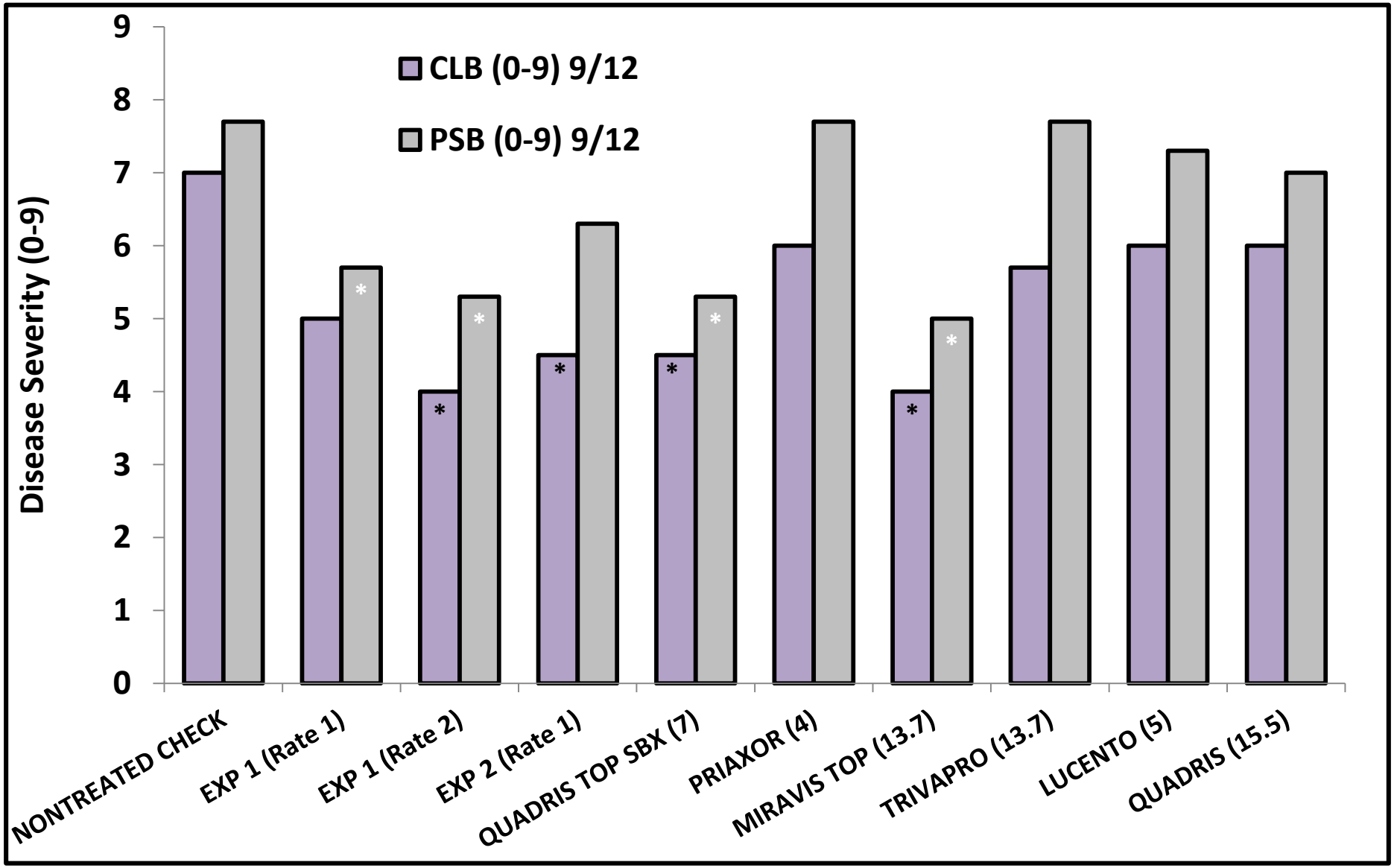
Cercospora leaf blight – Acadia



Pod and stem blight and seed quality – Acadia



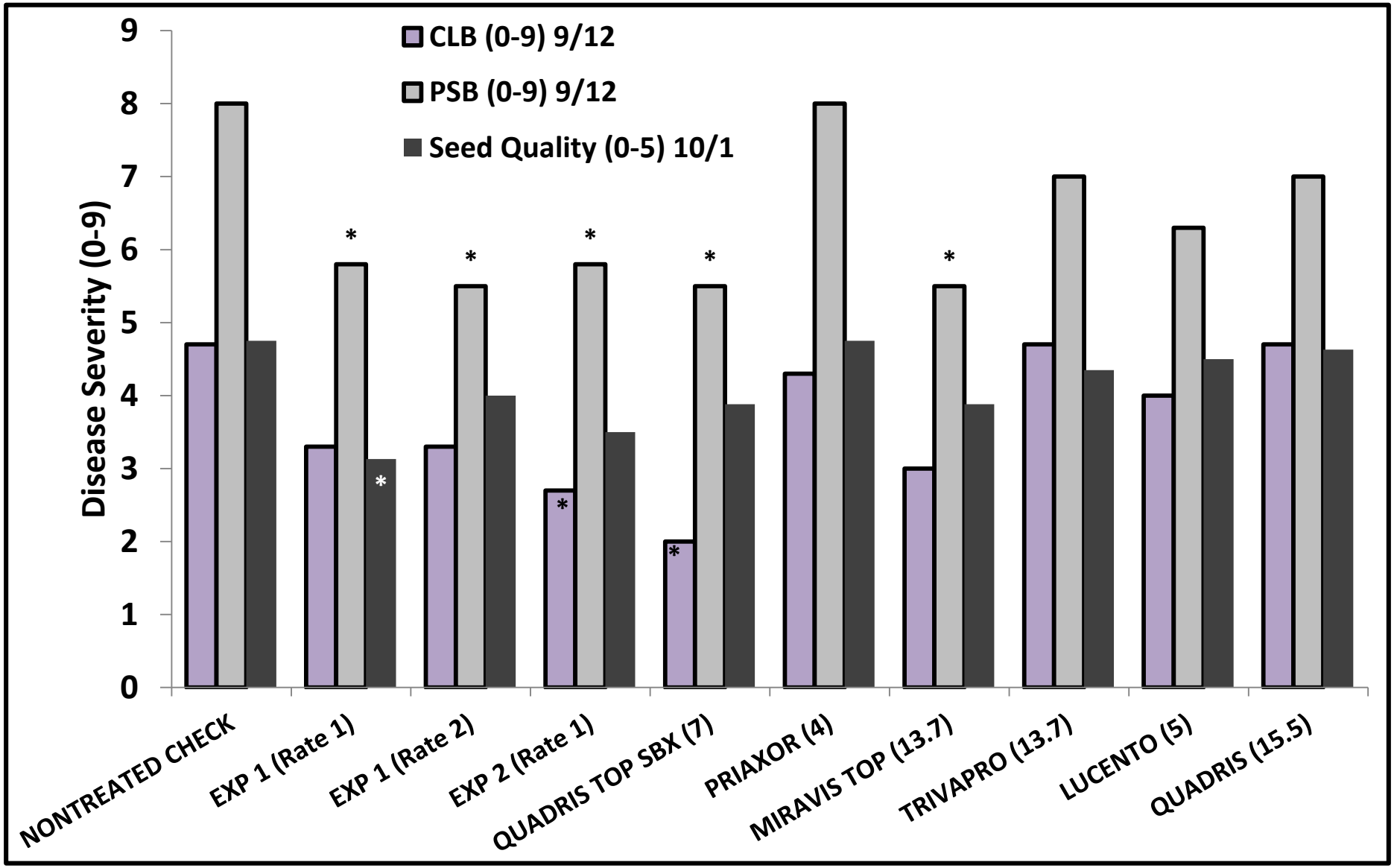
Fungicide Efficacy on CLB and PSB – Acadia 1



R4 and R5.5 application timing

OSSB1801-F1

Fungicide Efficacy on CLB, PSB, and seed quality – Acadia 2



R4 and R5.5 application timing

OSSB1801-F2

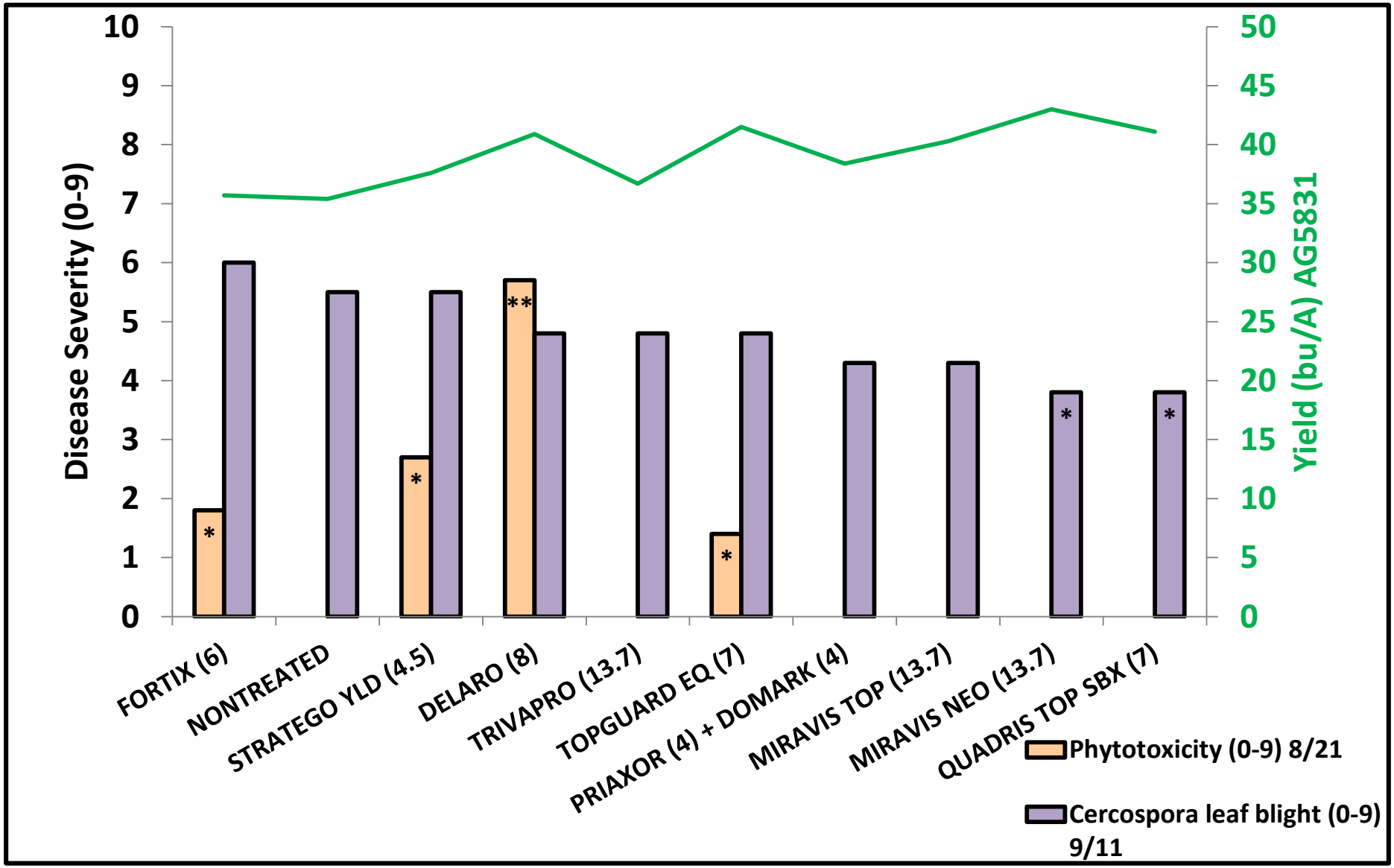
Cercospora leaf blight trial – Winnsboro, LA – 2017

NONTREATED VS TREATED – 2017, Winnsboro, LA

Cercospora leaf blight trials – 2017

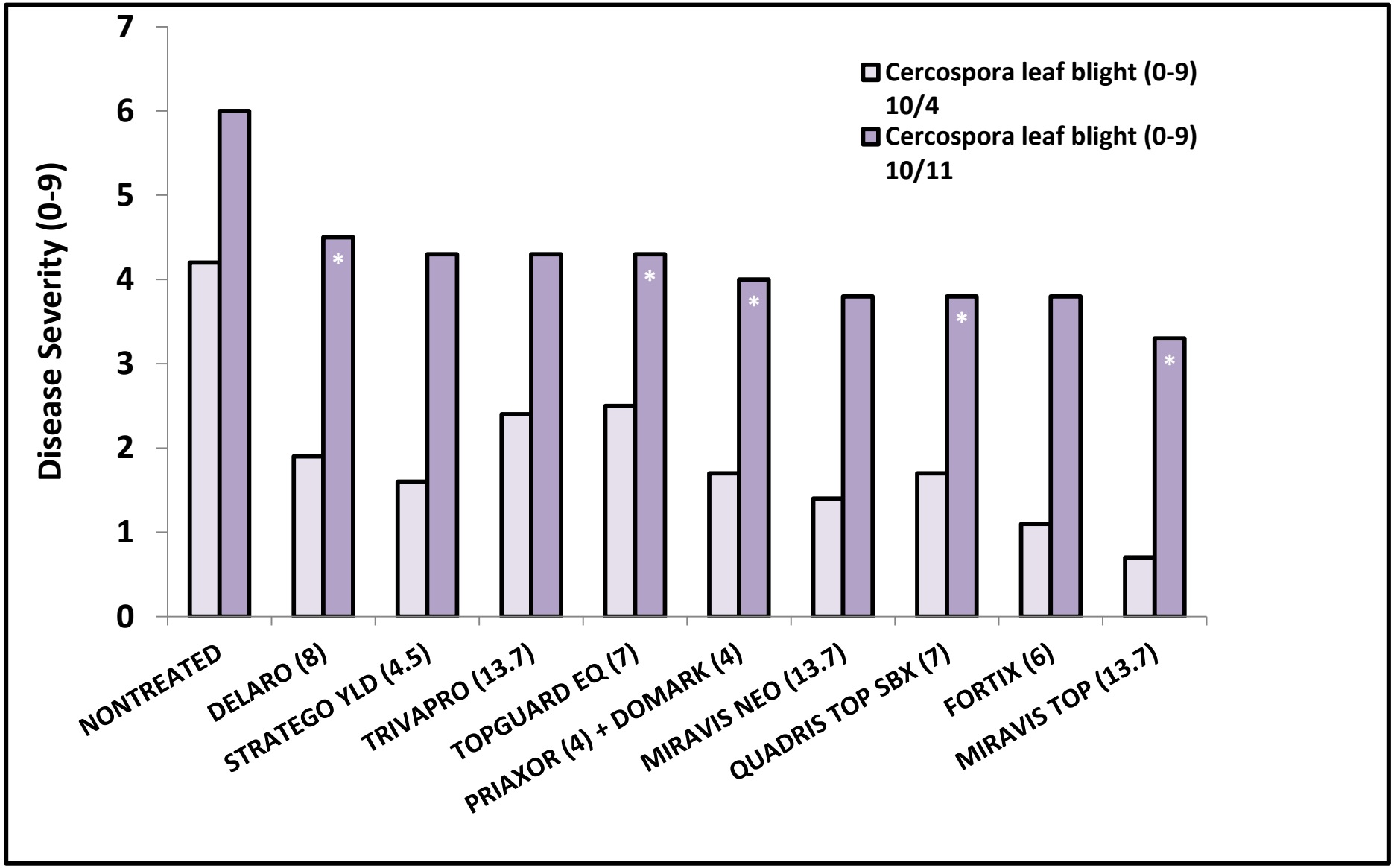

Cercospora leaf blight trials – 2018

Multiple programs – Winnsboro, LA – 2018



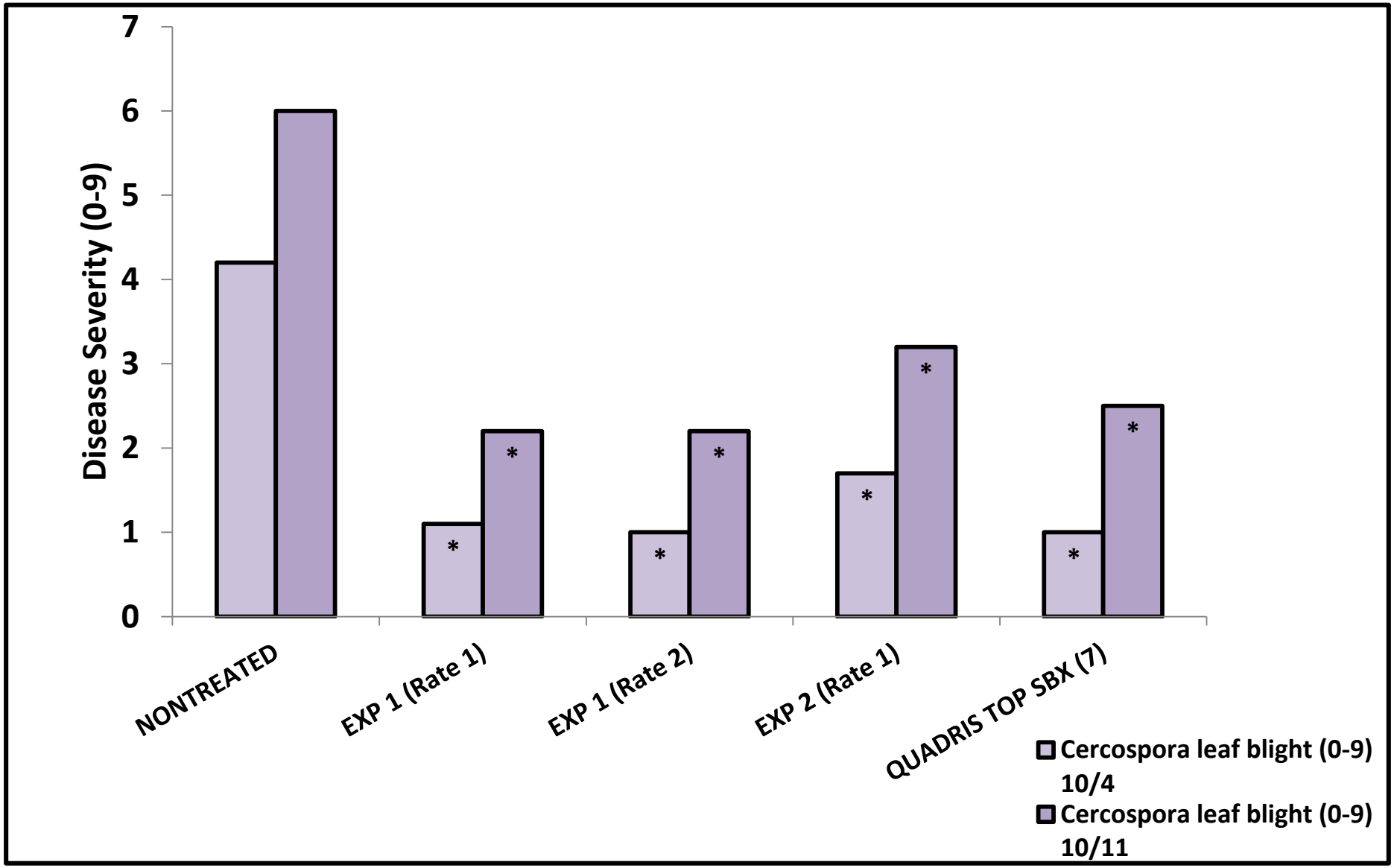
MRSB1813

Multiple programs – Alexandria, LA – 2018



DLSB1808

Promising Experimentals – Alexandria, LA – 2018



DLSB1806

Products that have somewhat consistent efficacy on CLB in the past few years

- Domark
- Miravis
- Priaxor
- Quadris Top SBX
- Topguard
- TrivaPro

NO GUARANTEES

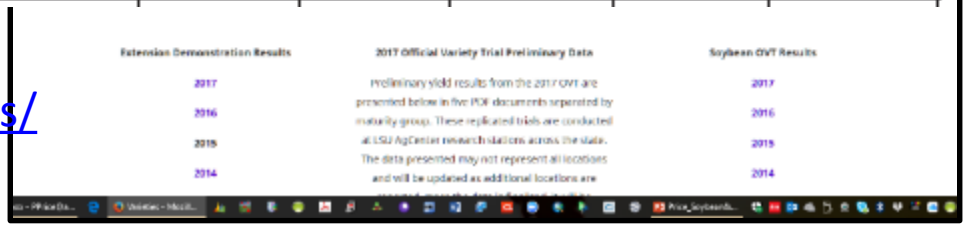
- **Possible reasons…**
- Genetic diversity in pathogens
- Ratio of pathogens in a given area
- Varying degrees of fungicide resistance across areas
- Differences in varietal responses to disease and/or fungicide application
- **Combinations of all of the above**

Official Variety Trials

Table 2B. MG 4.5-4.7 – Agronomic Data from Various Locations across Louisiana

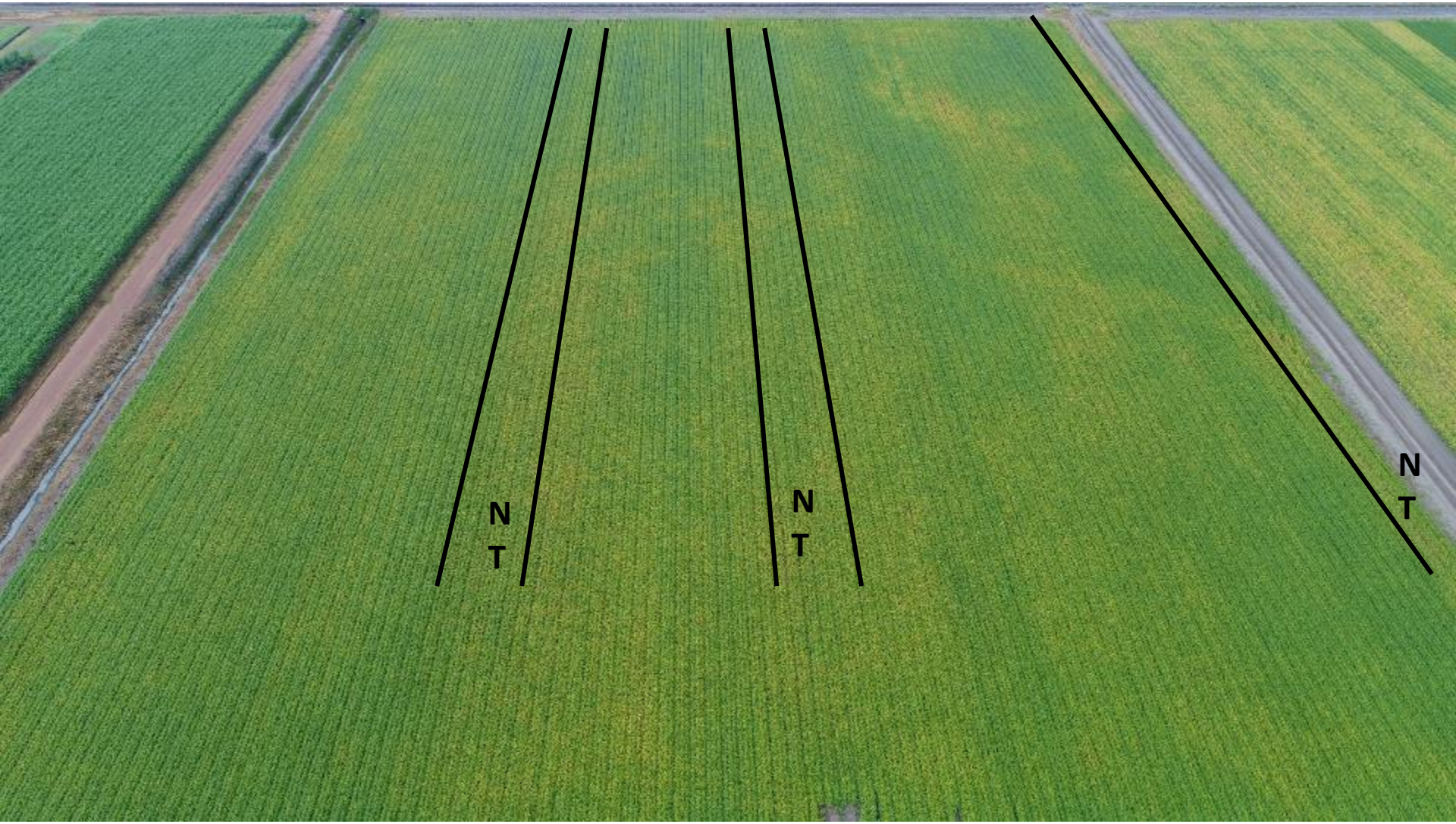
Variety	Dean Lee	Iberia	Rice Station	Macon Ridge Research Station			Northeast Research Station		
	Maturity[1]			CLB[2]	FLS[3]	TS[4]	CLB	FLS	TS
DG 4790RR2	125	120	125	1.7	0.0	1.0	2.0	1.0	3.0
DG 4670RR2	124	116	124	0.3	0.0	**3.3**	2.0	1.3	4.0
P45T74X	122	113	124	1.3	1.3	**3.3**	**3.7**	2.0	2.3
REV 45L57	121	117	125	1.0	0.3	**6.7**	2.0	1.0	**4.5**
REV 47R34	124	117	124	0.3	0.3	2.3	1.0	0.7	2.3
REV 45A46	123	115	123	1.7	1.3	1.7	**3.0**	1.3	1.7
DG 4587LL	125	114	123	1.0	0.0	1.7	0.0	0.3	1.0
479 GTS	124	112	114	0.7	**2.0**	2.0	1.3	1.3	2.0
S14-9051R	128	119	123	0.0	0.3	2.3	1.3	0.3	1.0
S14-15146R	127	114	124	1.3	0.7	**3.3**	**3.0**	1.7	2.0
AGS GS45R216	126	116	124	0.7	1.0	1.7	1.7	0.3	1.7
S47RY13	125	117	126	1.0	0.3	2.3	2.3	1.7	2.7
SX17846XS	127	119	125	1.0	0.3	2.0	2.0	1.7	3.0
S45XS37	130	120	125	1.3	0.7	2.0	**2.7**	1.7	2.0

www.lsuagcenter.com/topics/crops/soybeans/



Variety Development

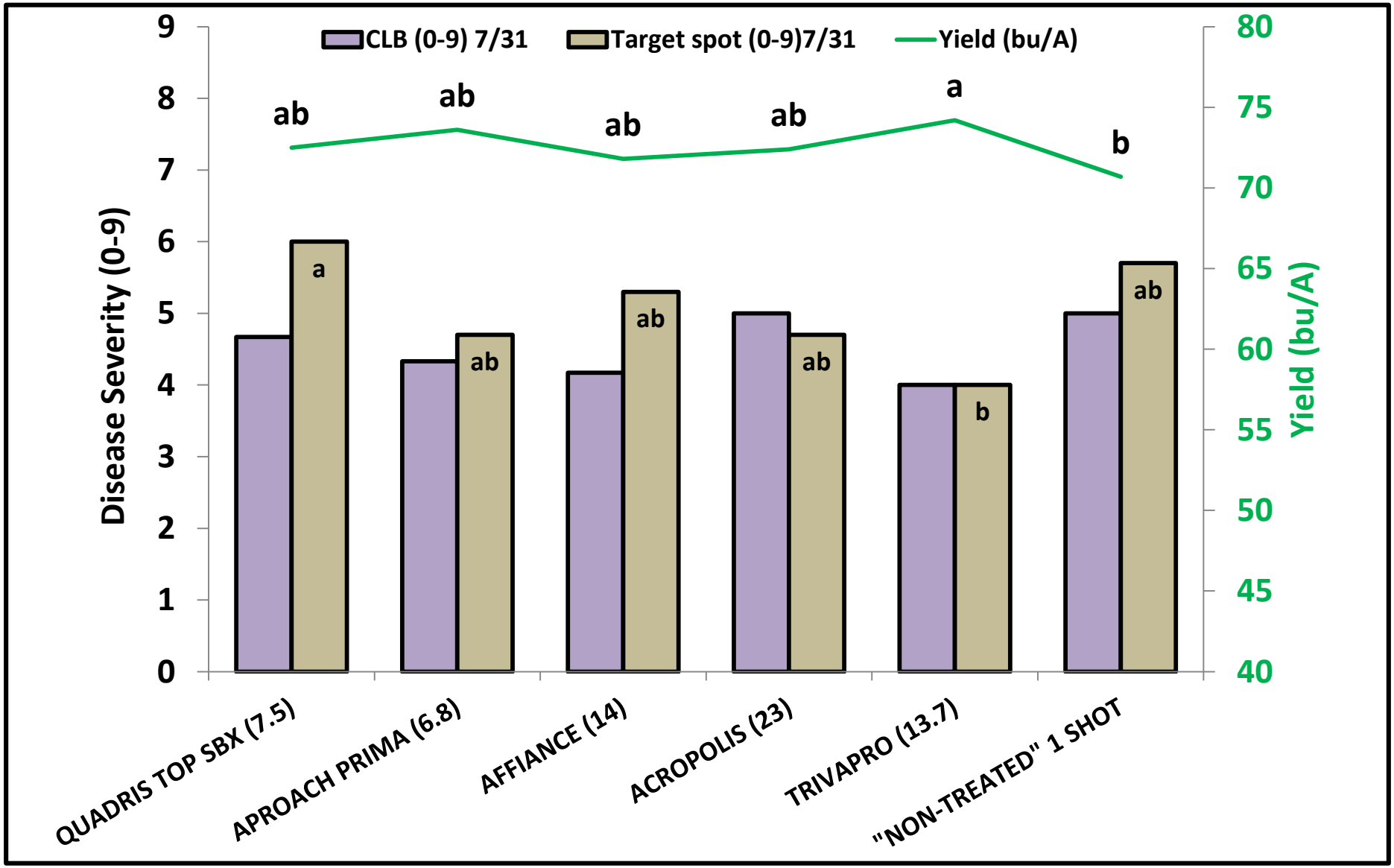
St. James Parish, LA – 2018



Thanks to Al Orgeron and Boyd Padgett

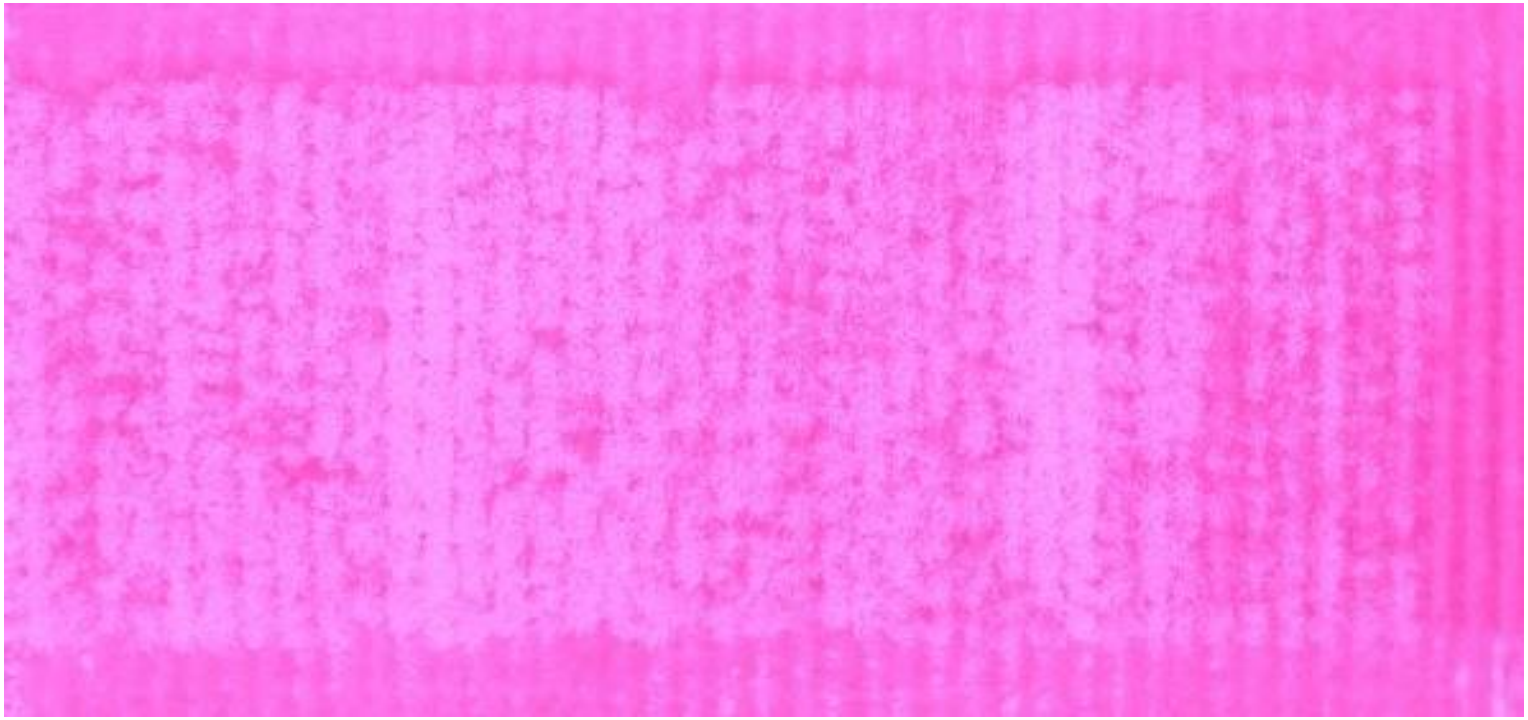
Target spot vs. CLB

St. James – Fungicide efficacy on CLB and target spot

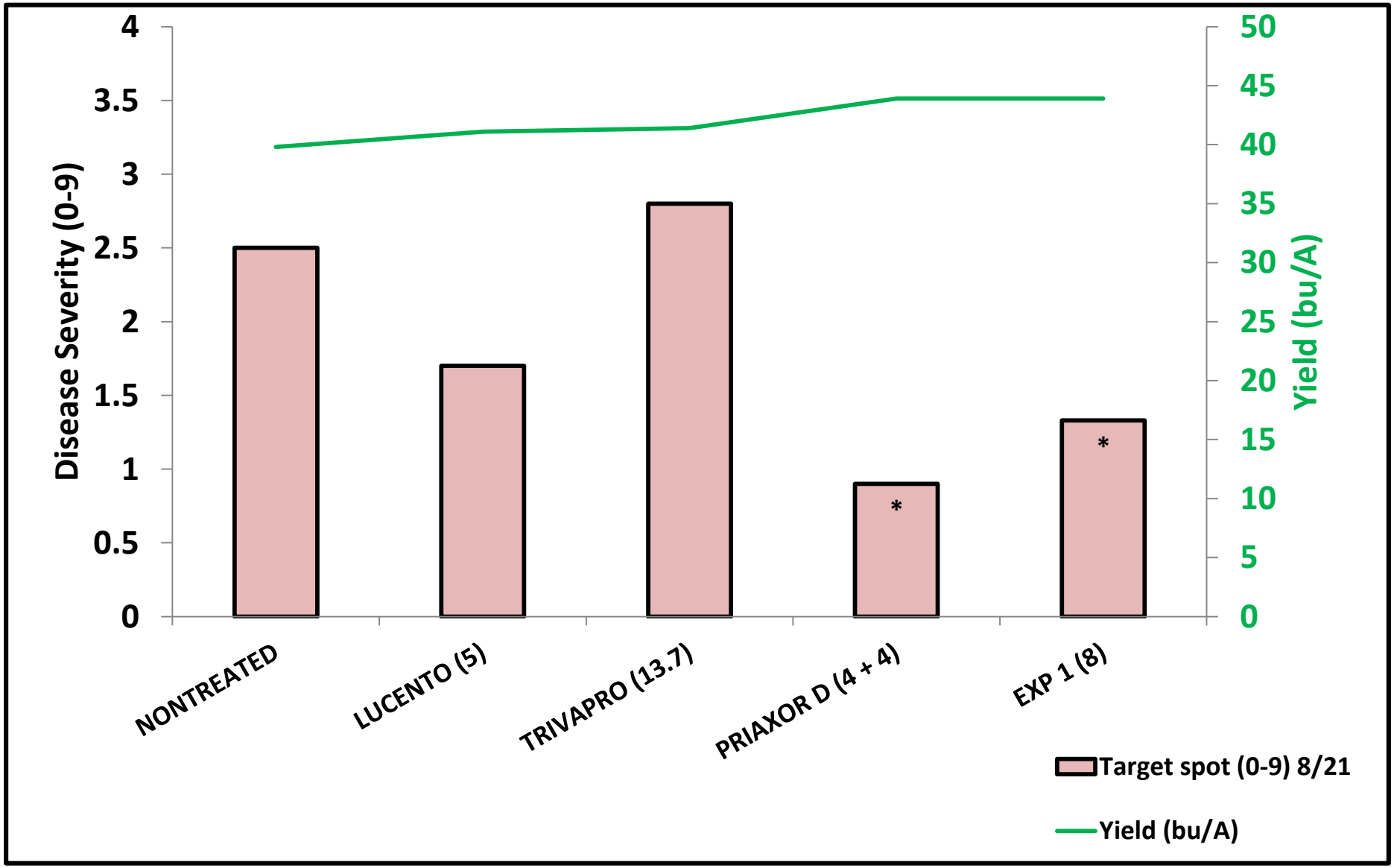


St. James

Target spot trial – Winnsboro, LA – 2018



Target spot trial – Winnsboro, LA – 2018



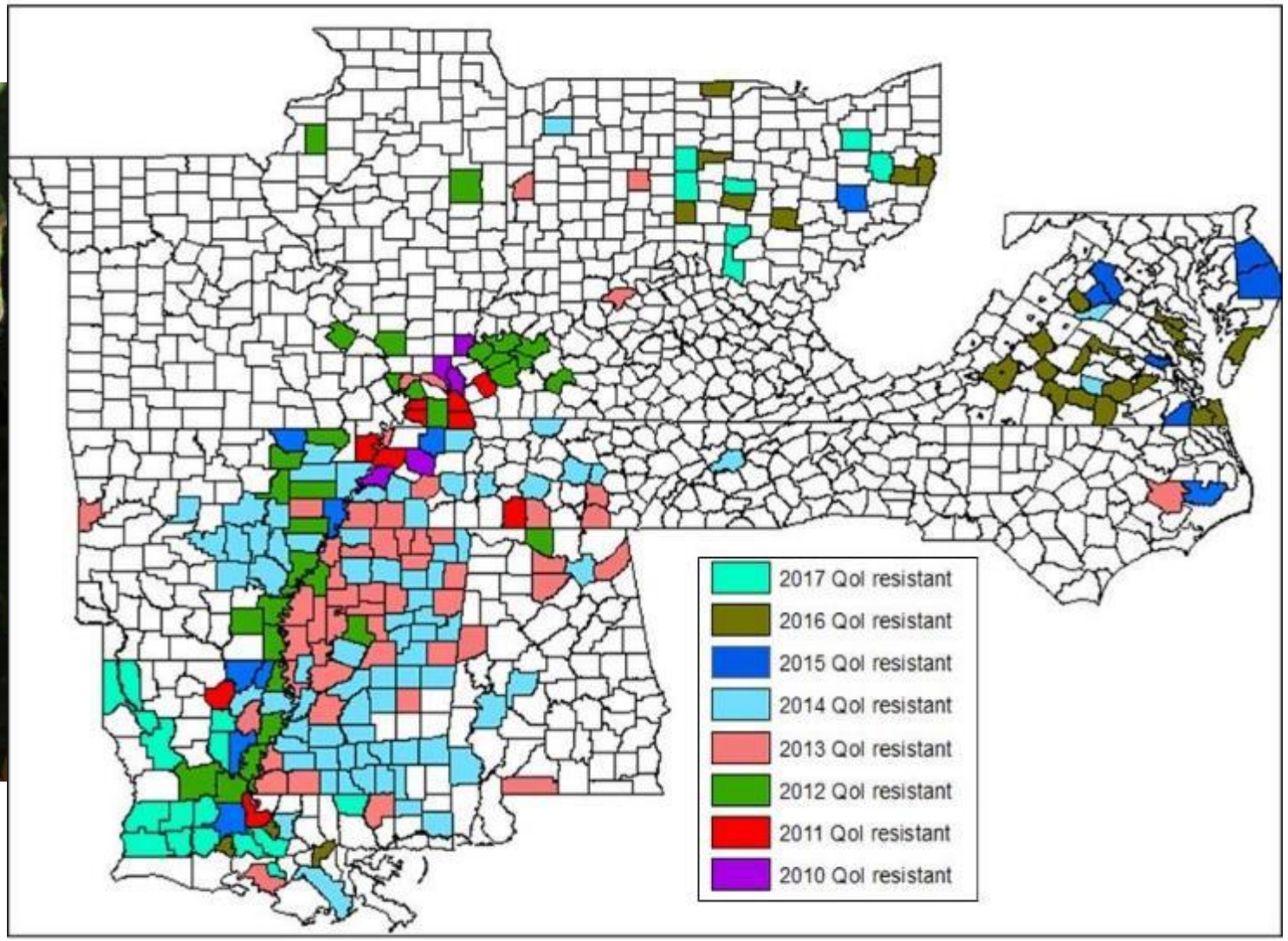
MRSB1808

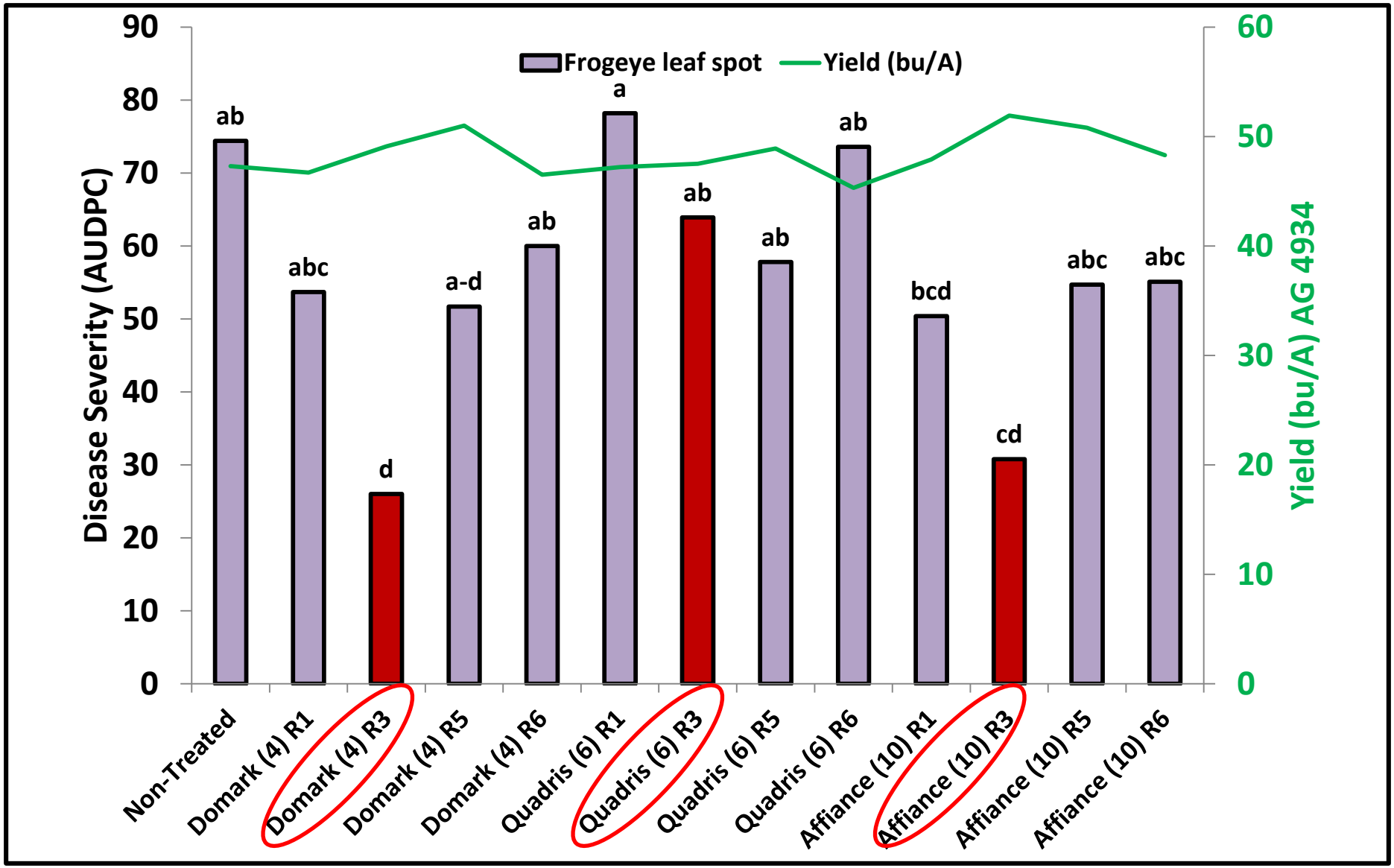
Frogeye leaf spot

Frogeye Leaf Spot – Fungicide Resistance

Strobilurin resistance confirmed in 36 parishes

Suspect that the majority (>90%) of the pathogen population is resistant





Regional Frogeye leafspot trial – Alexandria 2016.

DLSB1603

Active ingredient (%)	Product/Trade name	Rate/A (fl oz)	Aerial web blight[1]	Cercospora leaf blight[2]	Frogeye leaf spot[3]	Target spot
Azoxystrobin 22.9%	Quadris 2.08 SC Multiple Generics[4]	6.0 - 15.5	VG	P	F	P-F
Fluoxastrobin 40.3%	Aftershock 480 SC Evito 480 SC	2.0 – 5.7	VG	P	F	U
Picoxystrobin	Aproach 2.08 SC	6.0 -12.0	VG	P	F	U
Pyraclostrobin 23.6%	Headline 2.09 EC/SC	6.0 - 12.0	VG	P	F	P-F
Cyproconazole 8.9%	Alto 100SL	2.75 – 5.5	U	U	F-G	U
Flutriafol 11.8%	Topguard 1.04 SC	7.0 – 14.0	U	P-G[5]	VG	P
Propiconazole 41.8%	Tilt 3.6 EC Multiple Generics[4]	2.0 - 4.0	P	P	F	U
Prothioconazole 41.0%	Proline 480 SC	2.5 – 4.3	NL	NL	VG	U
Tetraconazole 20.5%	Domark 230 ME	4.0 – 5.0	NL	P-G[5]	VG	P
Thiophanate-methyl	Topsin-M Multiple Generics[4]	10.0 – 20.0	U	P	VG	U
Boscalid 70%	Endura 0.7 DF	3.5 – 11.0	U	U	P	U
Azoxystrobin 18.2% Difenconazole 11.4%	Quadris Top 2.72 SC, Quadris Top SBX	8.0 – 14.0 7.0 - 7.5	U	P-G[5]	VG	F-G
Azoxystrobin 7.0% Propiconazole 11.7%	Quilt 1.66 SC, Multiple Generics[4]	14.0 – 20.5	U	P	F	U
Azoxystrobin 13.5% Propiconazole 11.7%	Quilt Xcel 2.2 SE	10.5 - 21.0	VG	P	F	P
Benzovindiflupyr 2.9% Azoxystrobin 10.5% Propiconazole 11.9%	Trivapro	13.7-20.7	E	P-G[5]	F-G	U
Picoxystrobin 17.9% Cyproconazole	Aproach Prima 2.34 SC	5.0 – 6.8	U	P-G[5]	G	F-G

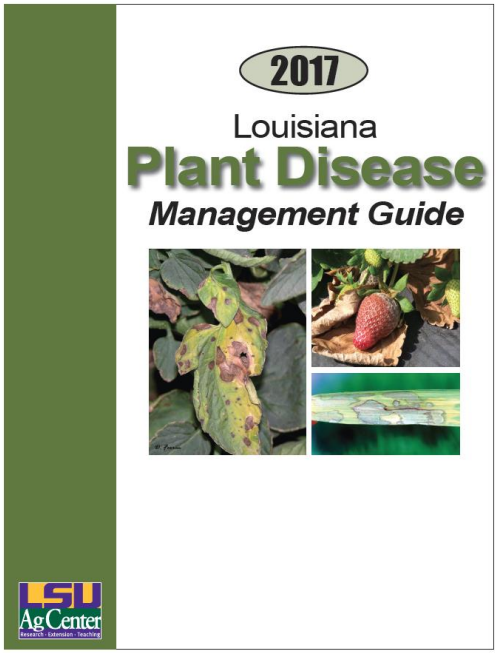
Salt Tolerance Ratings – Winnsboro, LA

MRRS OVT – 2016 – Seed Quality

					Purple Stain	% Damage
1 4880 RR	55.430 abc	55.520	2.5 a-d	3.0 a-e	12.4 g-m	5.0 g
4 4825 RR2	39.695 bc	46.330	3.0 a-d	4.5 a-d	19.4 c-k	11.1 b-g
7 4967 LL	47.645 abc	47.130	4.0 a-d	2.5 b-e	14.8 e-m	13.4 a-g
8 4970 RR	44.588 abc	46.290	1.5 bcd	4.5 a-d	24.9 b-i	11.9 b-g
9 4995 RR	58.433 ab	50.300	5.5 a-d	3.5 a-e	3.9 lm	6.0 efg
16 REV 49R94	50.055 abc	37.070	7.5 ab	2.0 cde	36.2 a-d	26.0 a-d
17 REV 49A75	51.653 abc	49.510	5.5 a-d	2.5 b-e	17.2 d-l	15.0 a-g
39 CZ 4818LL	49.370 abc	37.340	5.5 a-d	2.5 b-e	4.9 lm	8.5 d-g
40 CZ 4959RY	36.523 bc	45.800	3.5 a-d	3.0 a-e	14.0 f-m	13.9 a-g
42 CZ 4898RY	61.203 ab	34.090	0.0 d	3.5 a-e	7.3 j-m	18.4 a-f
45 S12-2418	45.820 abc	22.490	3.5 a-d	6.0 a	36.0 a-d	27.4 a-d
51 Rev 48A76	48.873 abc	34.470	7.5 ab	3.0 a-e	47.4 a	28.8 abc
52 Rev 48L63	29.365 c	47.800	7.5 ab	1.0 e	42.0 ab	42.1 a
53 Rev 49L49	48.230 abc	49.020	1.5 bcd	2.0 cde	9.7 i-m	8.5 d-g
71 Armor 49-D90	49.915 abc	31.890	5.5 a-d	3.0 a-e	22.9 b-j	11.9 b-g
73 AG 48X7	50.780 abc	49.980	2.0 bcd	2.5 b-e	8.6 i-m	6.7 efg
75 AG 49X6	39.983 bc	43.770	2.0 bcd	4.5 a-d	12.2 g-m	8.8 c-g

Seed Treatment Fungicides

- CDMS website: www.cdms.net
- Agrian website: www.agrian.com
- ~80 seed treatment or in-furrow fungicides labeled in soybean
- http://www.lsuagcenter.com/portals/communications/publications/management_guides



Seed Treatments, In-Furrow Sprays and Granular Fungicide Options
Field Crops

Table 1. Fungicide seed treatments, in-furrow sprays and granular options for field crops.

Product Name[1]	Company	Active Ingredient	FRAC Code[2]	Crop (Rate fl oz/cwt) Unless otherwise noted	Pathogens/Diseases Targeted
ACCELERON DC-309	Monsanto	metalaxyl	4	Corn (0.75)	*Pythium*
ACCELERON DC-509	Monsanto	ipconazole	3	Corn (0.085)	*Rhizoctonia, Fusarium, Phomopsis*
ACCELERON DT-510	Monsanto	myclobutanil	3	Cotton (1.25-4)	*Rhizoctonia solani, Thielaviopsis basicola, Pythium*
ACCELERON DX-109	Monsanto	pyraclostrobin	11	Cotton (1.5-3), Soybean (0.4-1.5)	*Pythium, Fusarium, Phomopsis, Rhizoctonia*
ACCELERON DX-309	Monsanto	metalaxyl	4	Cotton, Soybean, Corn (0.75-1.5)	*Pythium* seed rot, damping-off, *Phytophthora* (soybean) and systemic downy mildew (corn)
ACCELERON DX-509	Monsanto	ipconazole	3	Cotton (0.085-0.34), Corn (0.085)	*Rhizoctonia, Fusarium, Phomopsis*
ACCELERON DX-612	Monsanto	fluxapyroxad	7	Cotton (0.47-0.94), Soybean (0.24-0.47)	*Rhizoctonia solani* and *Fusarium*
ACCELERON DX-709	Monsanto	trifloxystrobin	11	Cotton, Corn (0.32-0.64)	*Alternaria, Aspergillus, Cladosporium, Penicillium, Rhizoctonia solani* and *Fusarium*
ACQUIRE	BASF	metalaxyl	4	Cotton, Soybean, Corn, Peanut, Wheat, Oats, Rice (0.75 minimum), Sorghum (0.375-1.5)	*Pythium, Phytophthora*
ACTINOVATE AG[BC]	Novozymes BioAg	*Streptomyces lydicus* WYEC 108	n/a	Cotton, Corn, Peanut, Soybean, Sorghum, Wheat (2-6)	*Fusarium, Rhizoctonia, Pythium, Phytophthora, Xanthomonas perforans, Verticillium, Botrytis, Sclerotinia, Monilinia, Alternaria, Erwinia*
ACTINOVATE STP[BC]	Novozymes BioAg	*Streptomyces lydicus* WYEC 108	n/a	Cotton (4-8), Corn (1-2), Peanut (0.74-1.5), Soybean (0.31-0.64)	*Fusarium, Rhizoctonia, Pythium, Phytophthora, Xanthomonas perforans, Verticillium, Botrytis, Sclerotinia, Monilinia, Alternaria, Erwinia*
AFRAME	Syngenta	azoxystrobin	11	Corn, Cotton, Grain Sorghum, Peanut, Soybean (0.4-0.8 fl oz/1,000 row ft)	Soilborne/seedling disease control
AFTERSHOCK	Loveland	fluoxastrobin	11	Corn, Peanut, Soybean (0.16-0.24 fl oz/1,000 row ft)	*Rhizoctonia solani, Pythium* spp., *Sclerotinia rolfsii*

Soybean Seed Treatment Advice

- Do your homework…figure out which fungicides are already on the seed…may vary with company.
- “Base” fungicides usually consist of metalaxyl/mefenoxam+broad spectrum QoI/DMI
- Base treatments are adequate in soybean
- It is redundant to over-treat with the same MOA
- Fungicides are not needed with optimum conditions
- Even “Cadillac” treatments fail under worst case scenarios
- Seed supply is an issue this year…

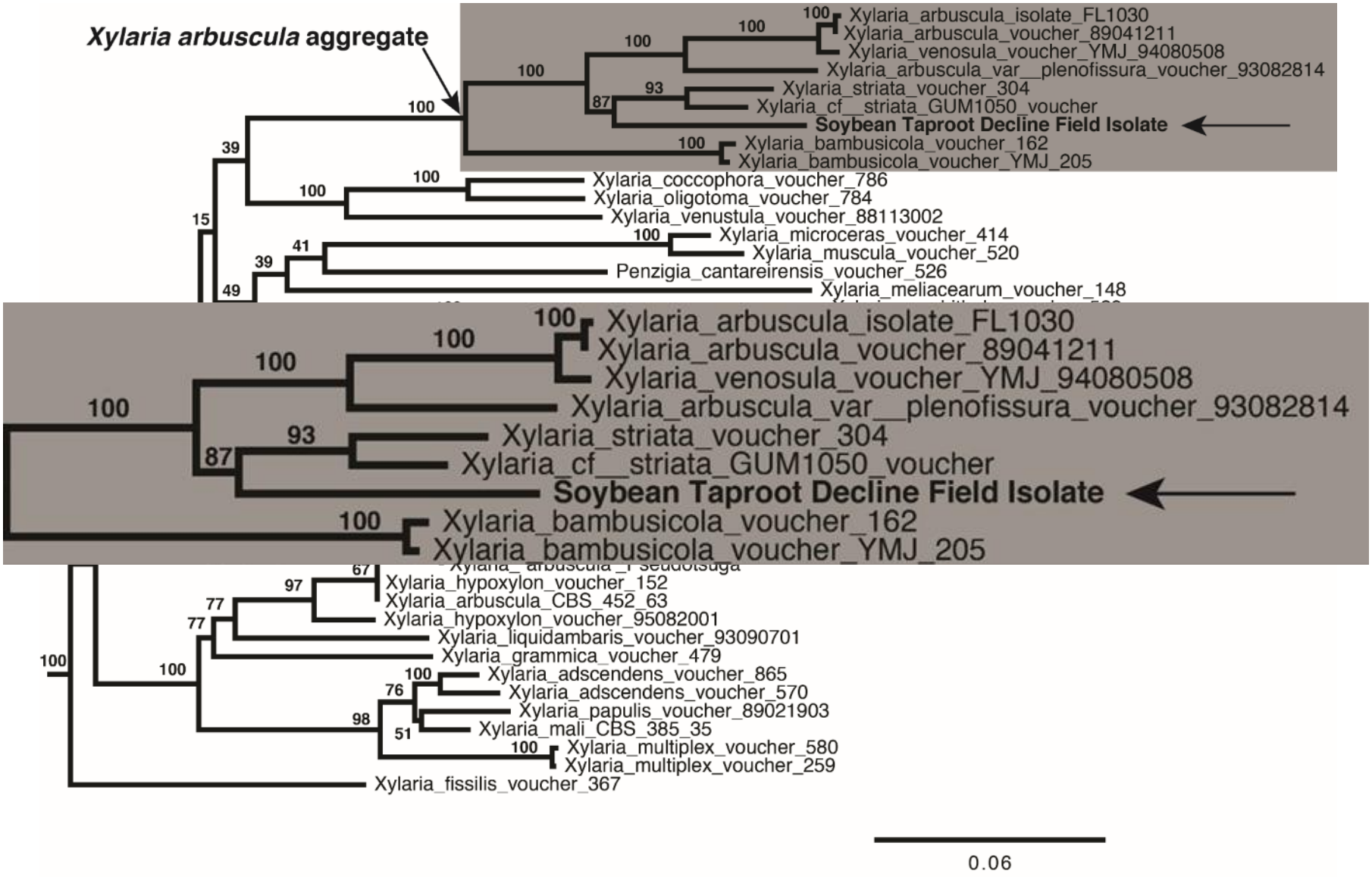
TAPROOT DECLINE
FIRST REPORT – AR, AL, LA, & MS - 2017

Allen
Bluhm
Conner
Doyle
Price
Sikora
Singh
Spurlock
Tomaso-Peterson
Wilkerson

Plant Health Progress. 2017. 18:35-40

https://apsjournals.apsnet.org/doi/10.1094/PHP-01-17-0004-RS

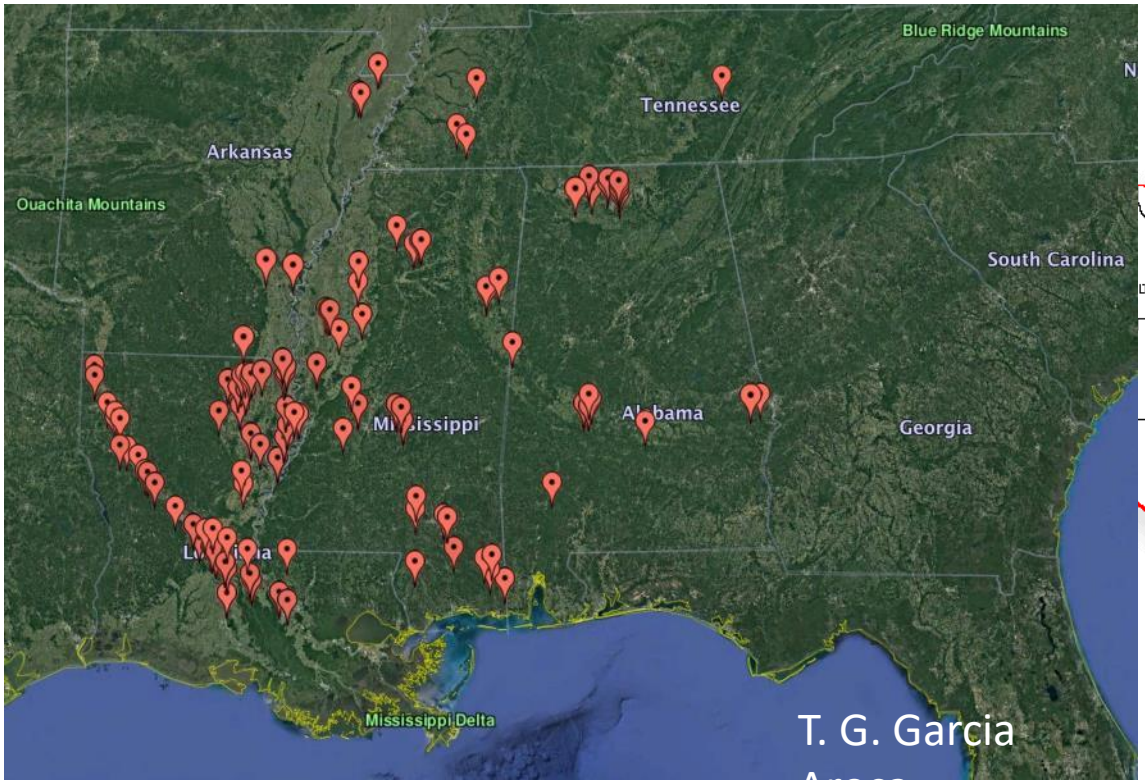
Phylogenetic Characterization

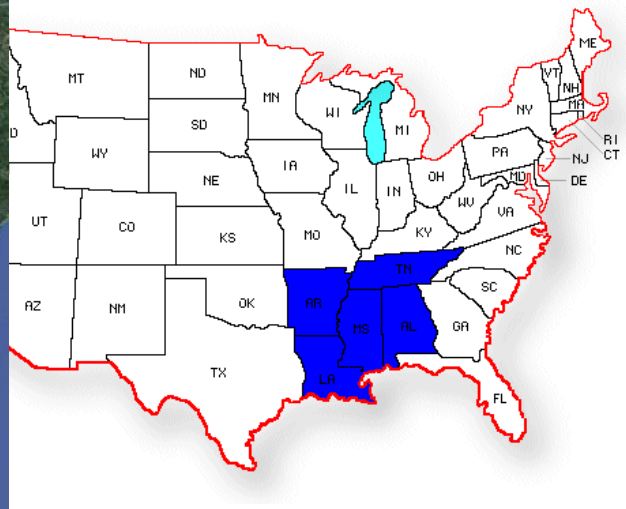


Taproot decline is caused by *Xylaria* sp.

Distribution of the pathogen

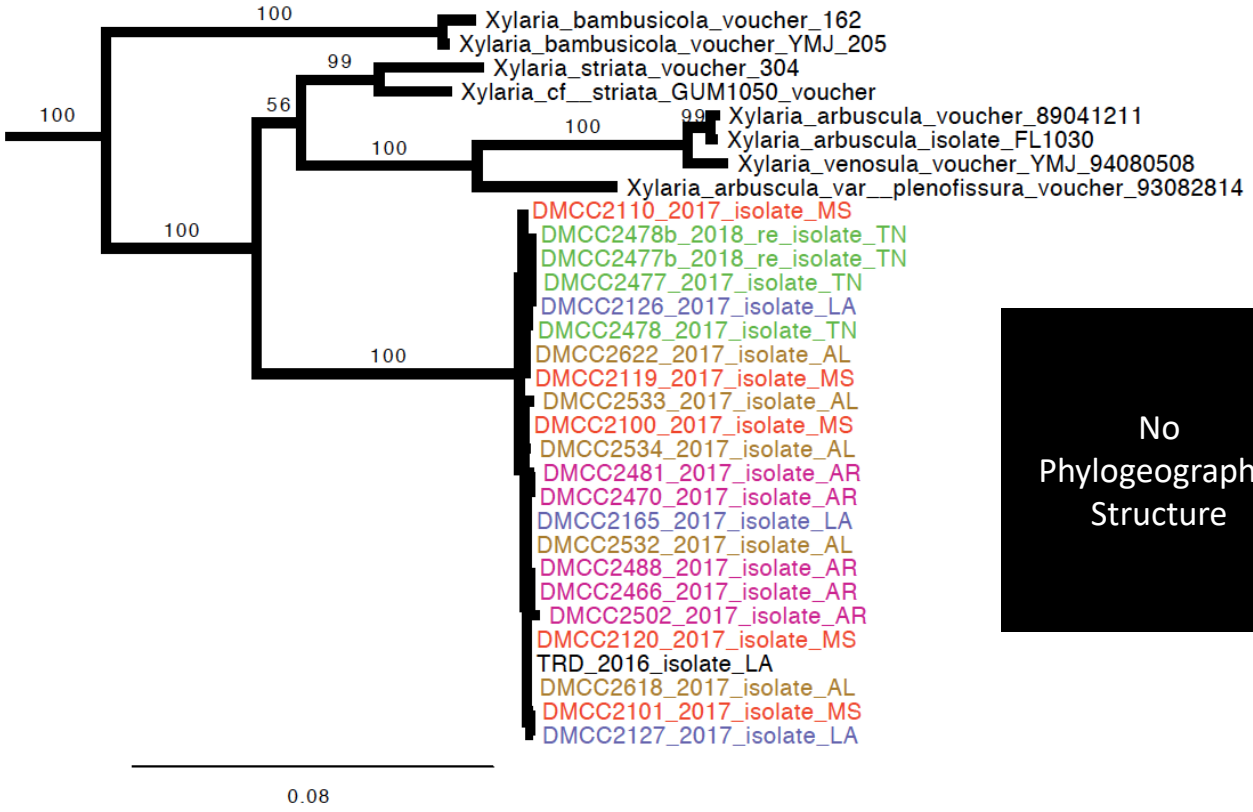
- Taproot decline has been reported in AR, AL, LA, MS, and TN
- MO? IL? IN? KY? GA? FL?





Isolates of the TRD pathogen do not cluster genetically by region.

All closely related…



No Phylogeographic Structure

Low genetic diversity = “recent” introduction

What is Xylaria???

- Vague report of *Xylaria* on soybean seed, 1979
- Known saprophytes (wood rotters)
- Few pathogenic: *X. mali* (apple) and *X. acuta* (cherry)
- Some species are endophytes (friendly fungi)

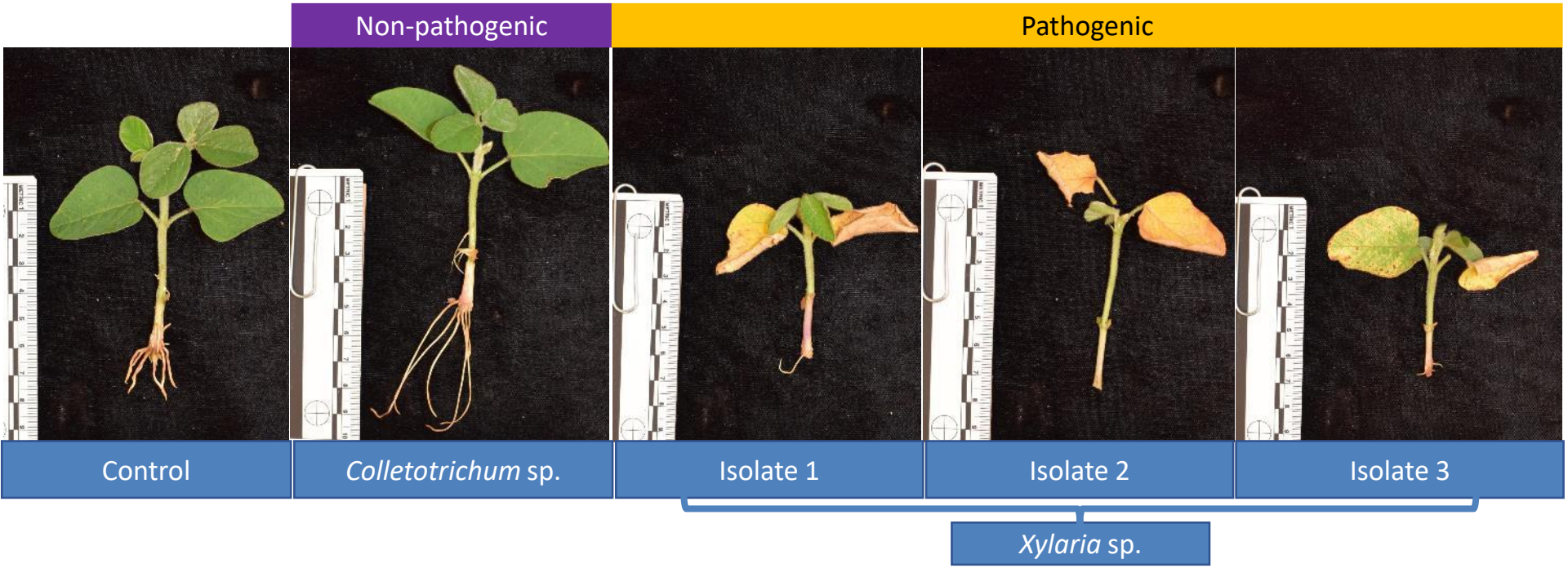
Why soybean???

Good Question!

Symptoms

Lagniappe…

Mycotoxins (presumably) produced by *Xylaria* (TRD) isolates reproduce the symptoms observed in the field.

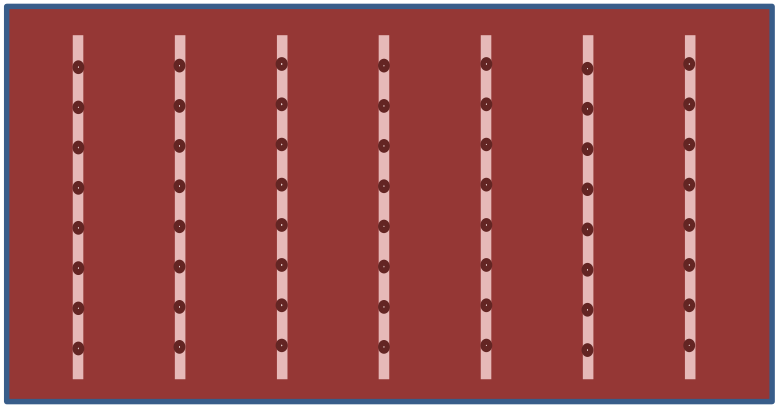


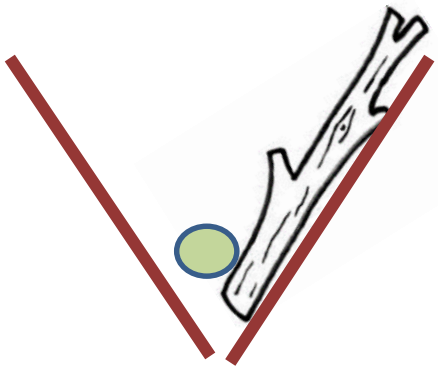
Doyle and Garcia, LSU AgCenter

Symp

Taproot decline also is a seedling disease…

Root Symptoms





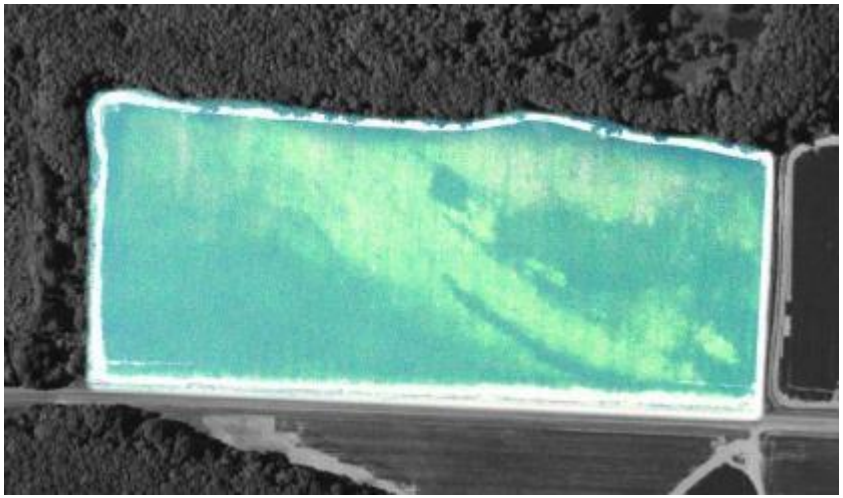
- Soybean monoculture
- Reduced tillage
- Debris accumulation
- Super accurate planting

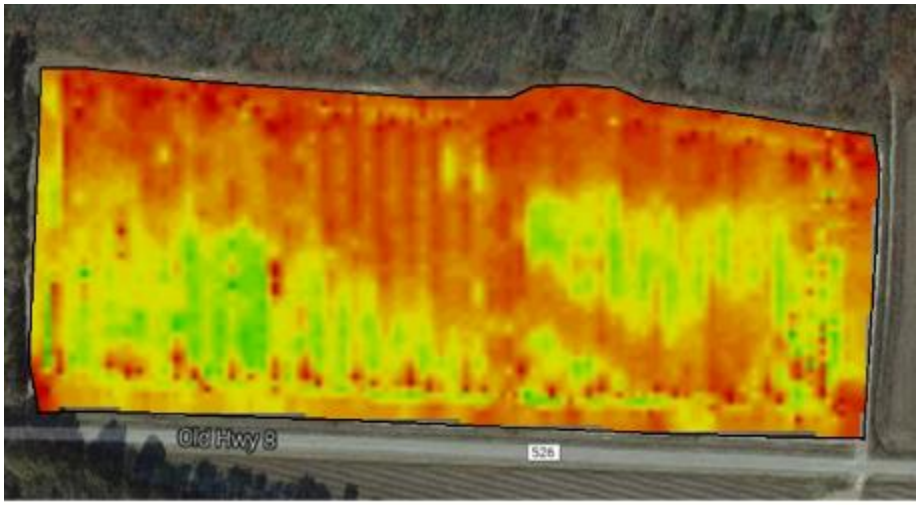
YOU ARE AT RISK!!!

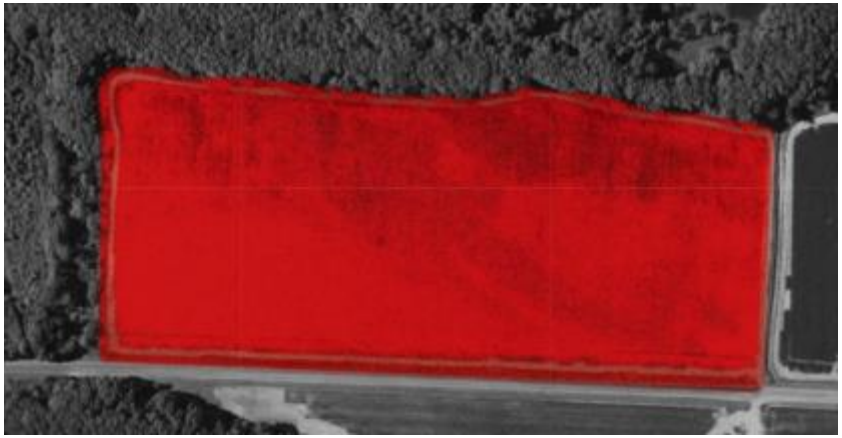
Taproot decline can cause serious yield losses…

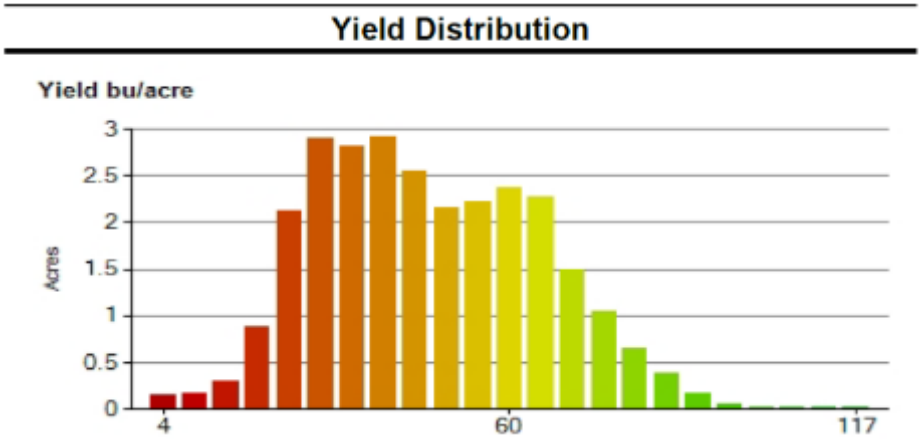
Dr. Terry Spurlock, University of Arkansas, 2018

Aerial Imagery and Yield (MS)



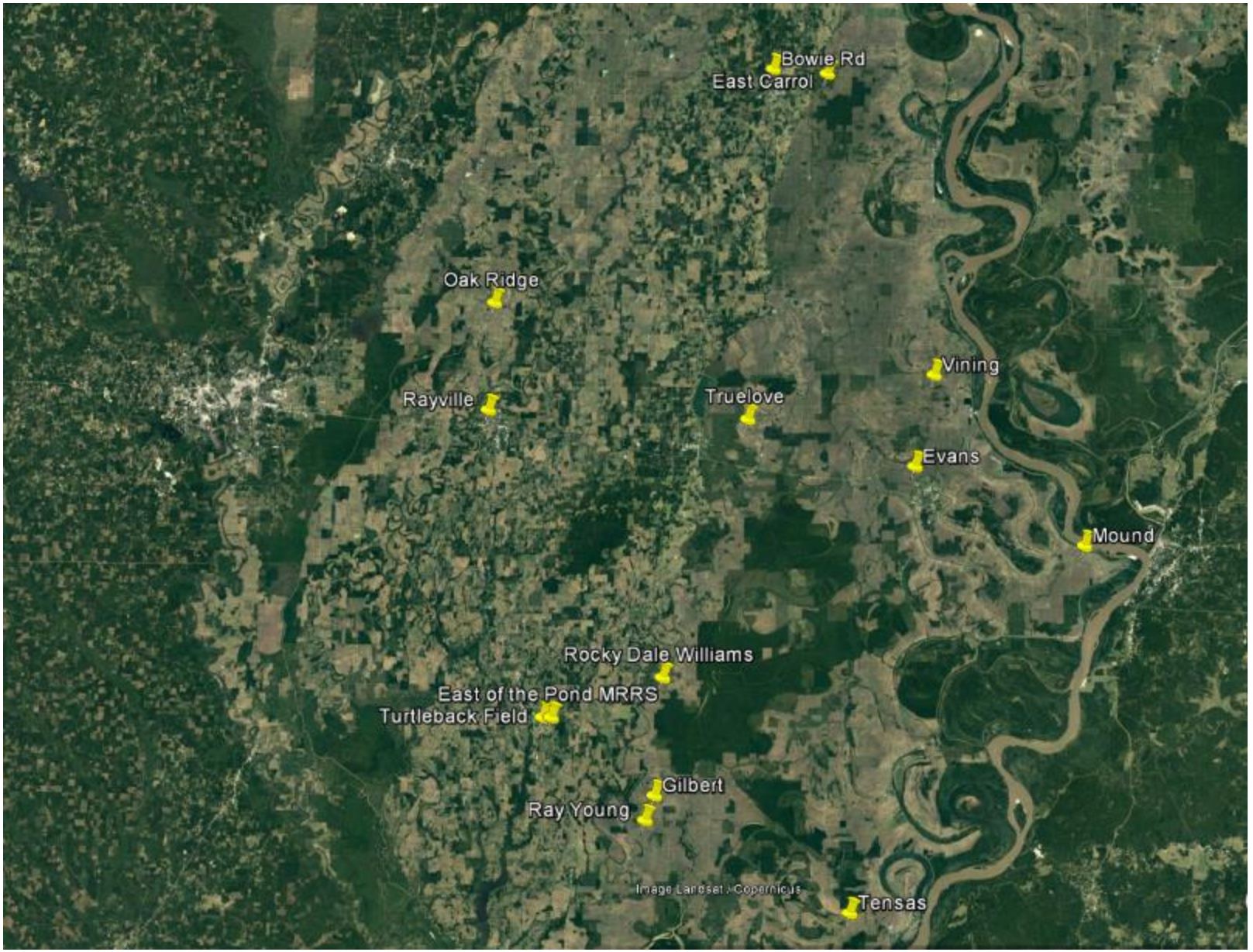




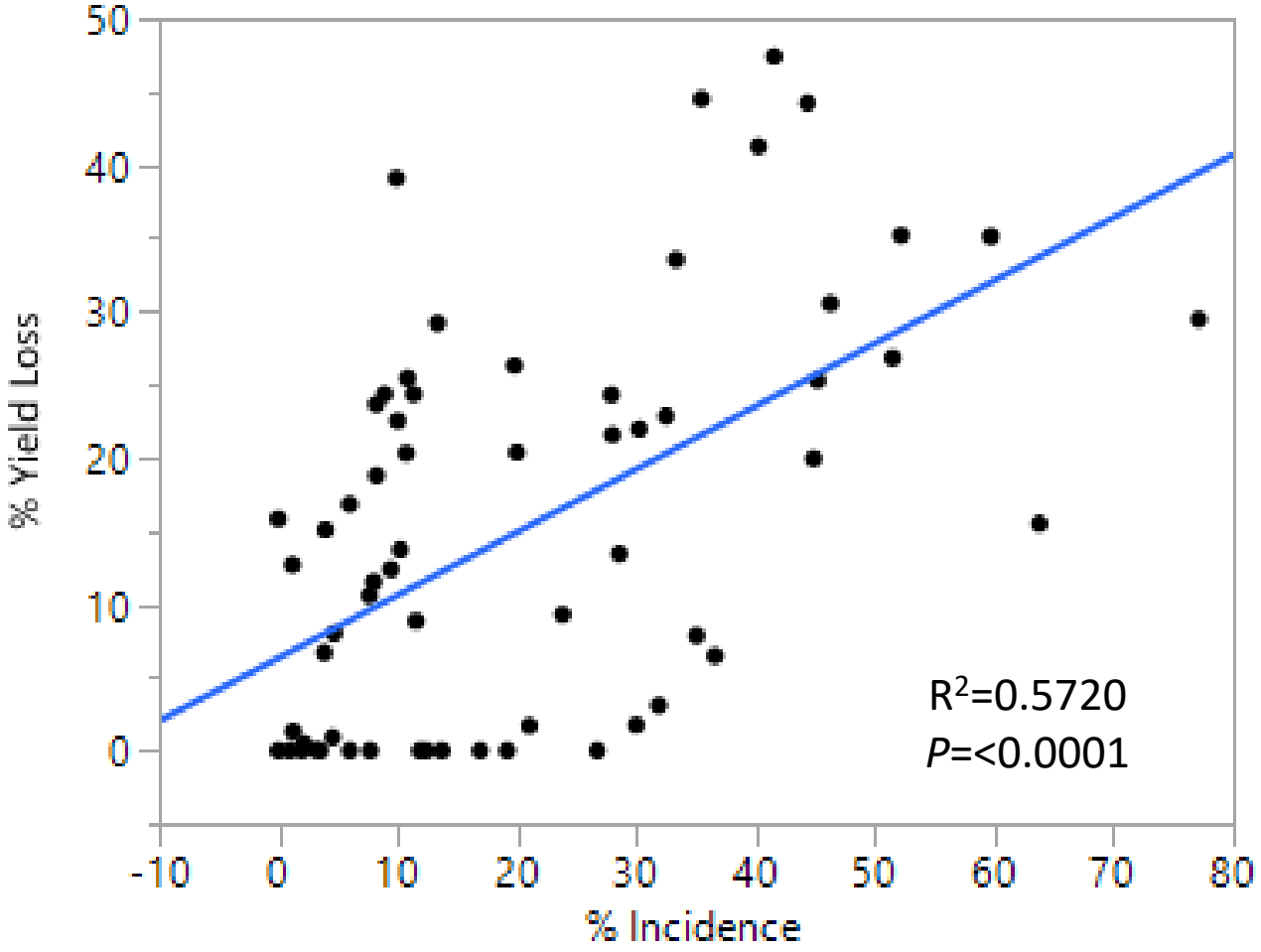


Spurlock & Allen

On-farm yield loss estimates

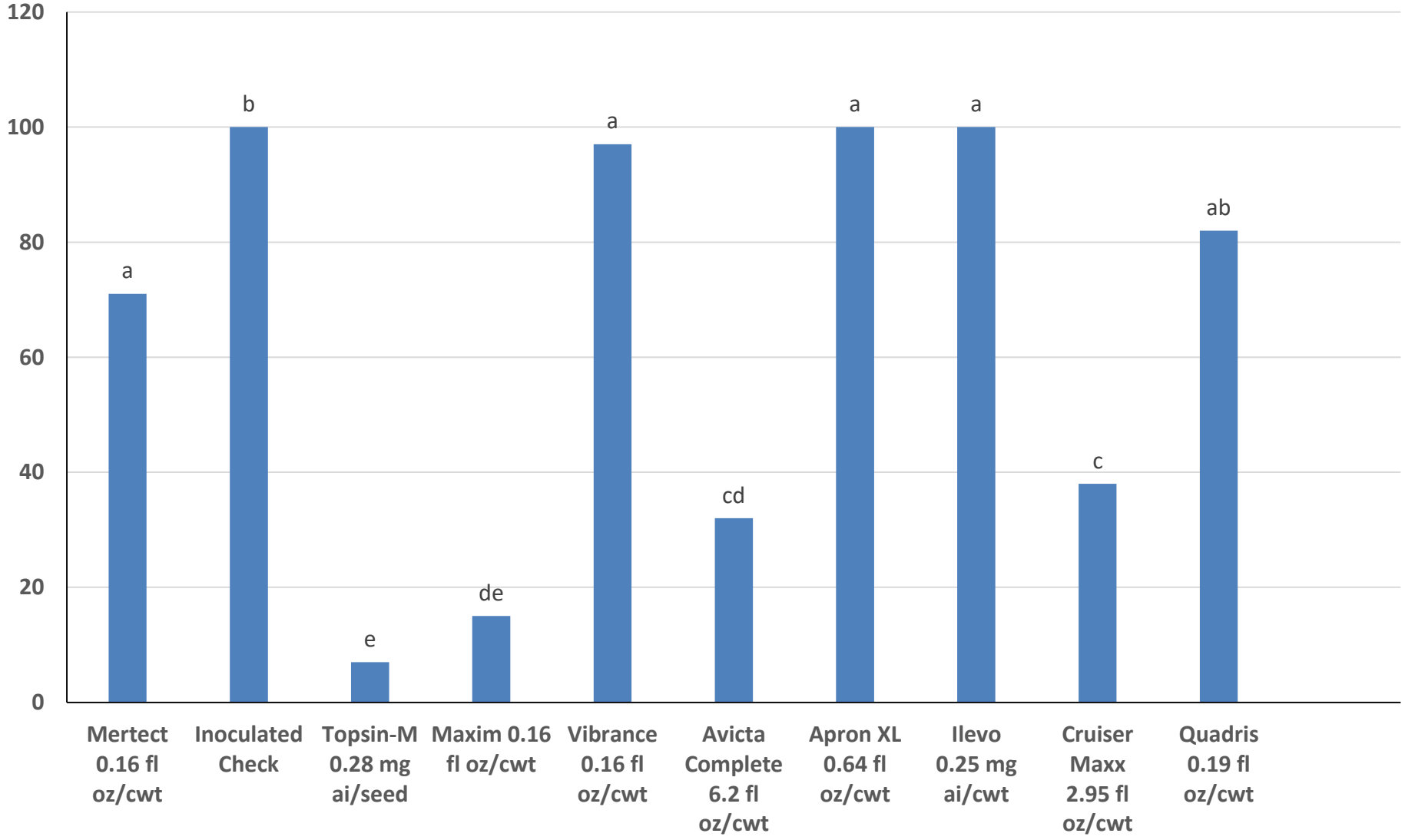


On-farm yield loss estimates



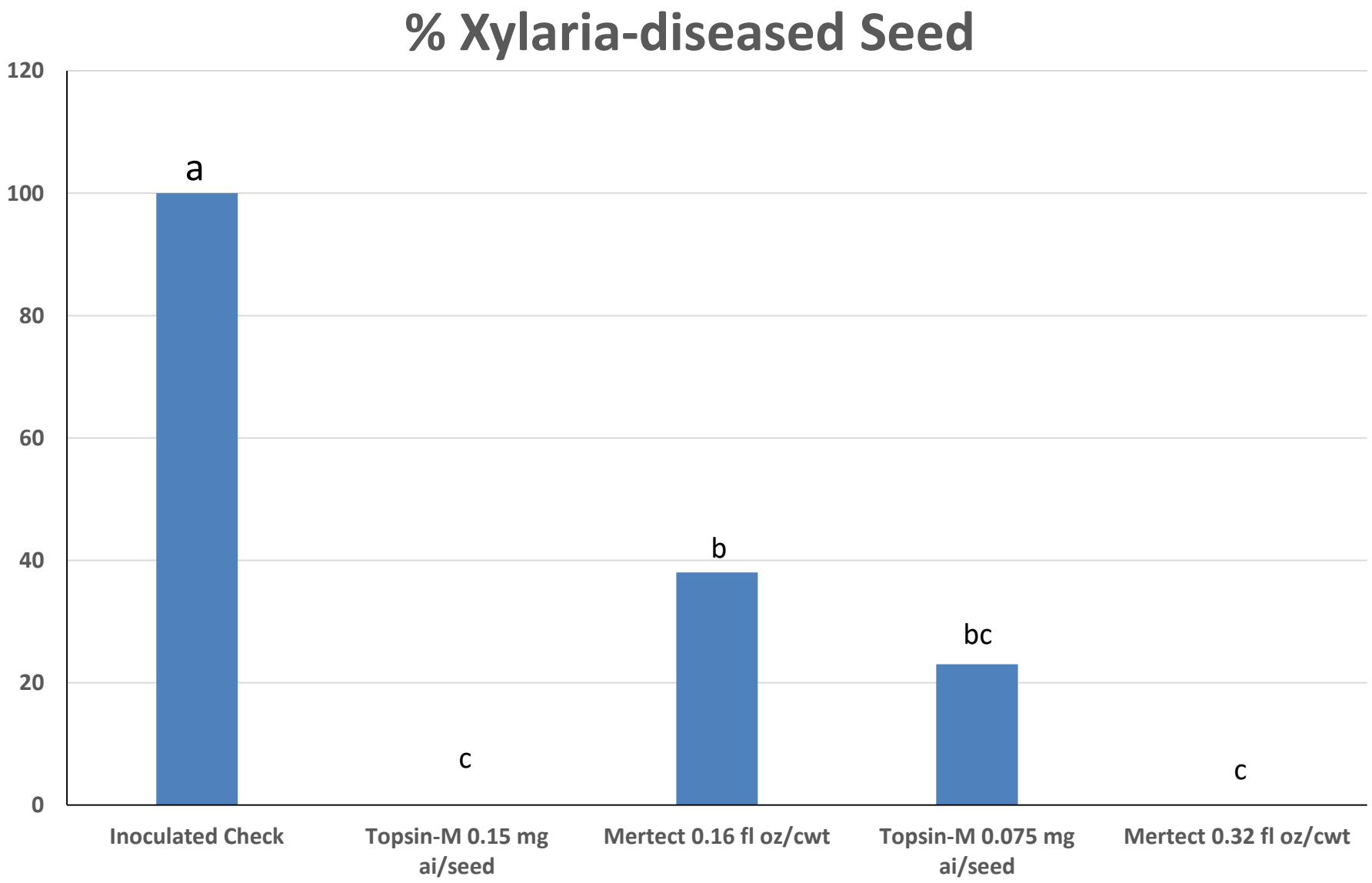
- **Disease loss estimates available in March 2019 for all affected states.**
- **In Louisiana, losses have ranged from 700K-3.5M bu annually since 2014.**

% Xylaria-diseased Seed



LAB STUDY, Dr. Terry Spurlock

P=0.01



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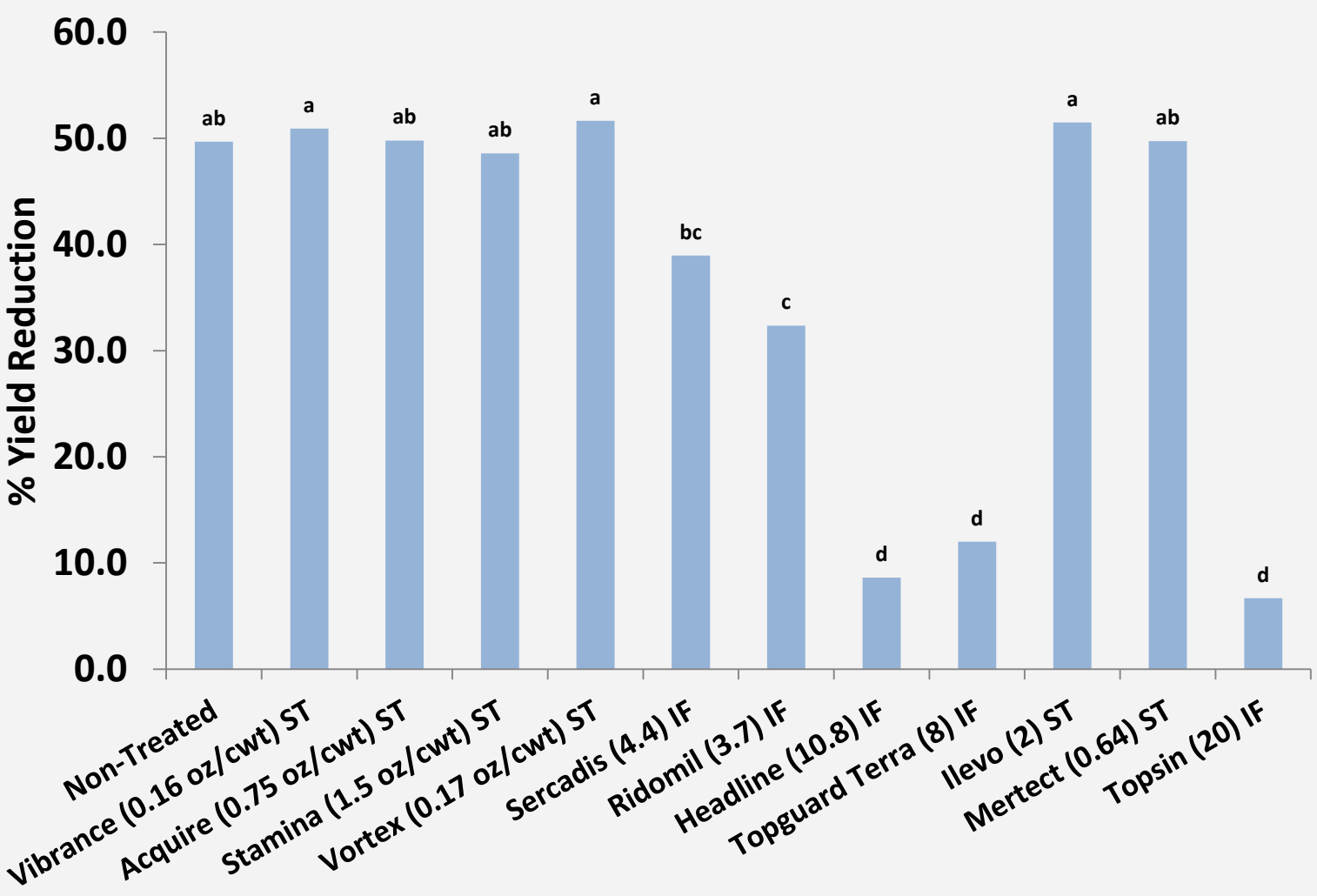
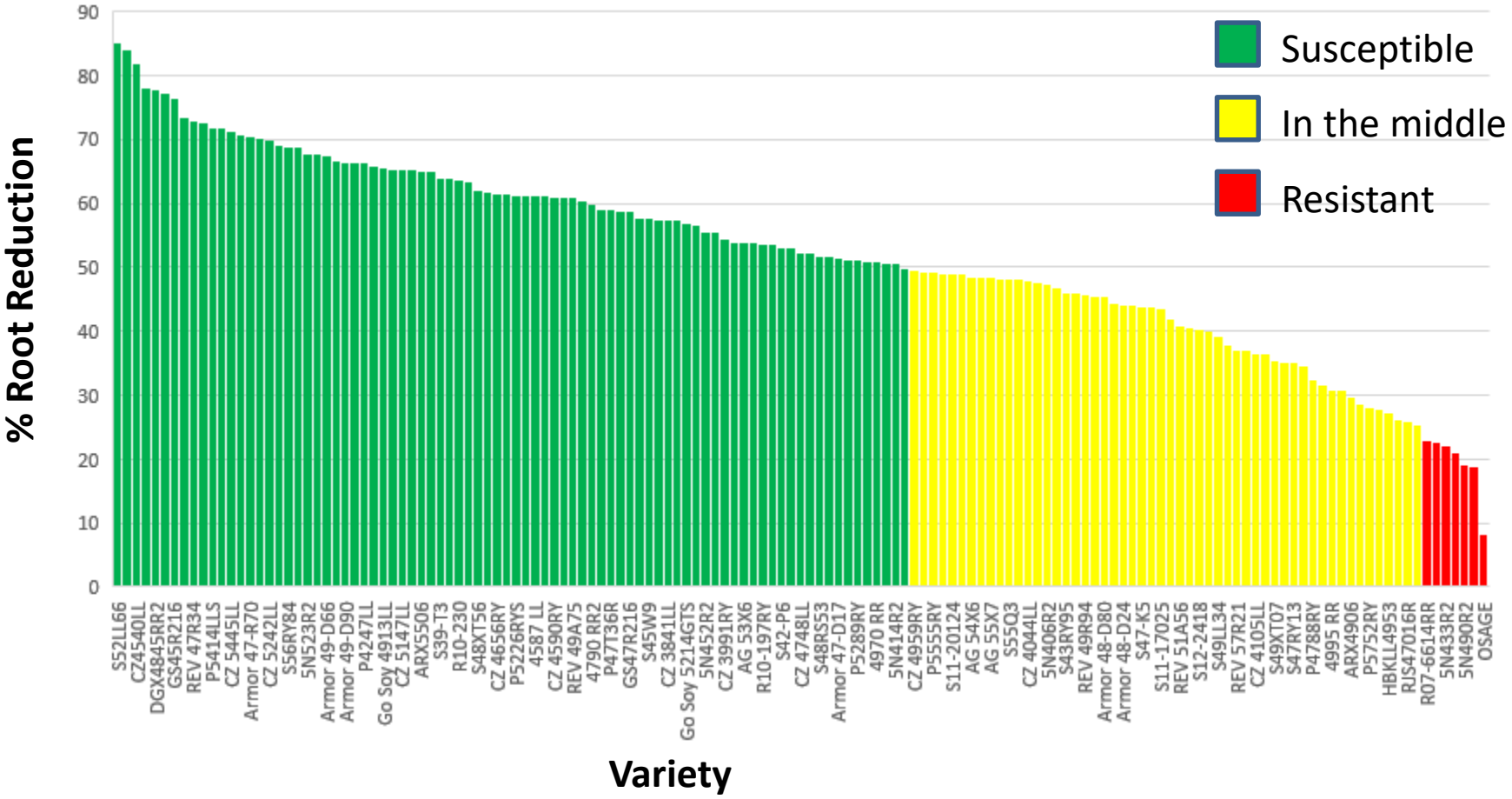
P=0.01

Effect of seed treatment and in-furrow spray on taproot decline – DREC 2016



Variety Screening

www.louisianacrops.com



Resistant varieties (<24% root reduction)

Variety	% Root Weight Reduction
OSAGE	8.391702
CZ 4818LL	18.879462
5N490R2	19.263012
S42RY77	20.944016
5N433R2	22.215409
5067 LL	22.559704
R07-6614RR	22.970824

MR varieties (24-36% root reduction)

Variety	% Root Weight Reduction
Armor 55-R68	25.253945
RJS47016R	25.793535
CZ 5375RY	26.205598
HBKLL4953	27.339808
4880 RR	27.926596
P5752RY	28.094408
CZ 5225LL	28.605468
ARX4906	29.805397
Go Soy IREANE	30.762175
4995 RR	30.883269
AG 48X7	31.611326
P4788RY	32.46393
AG 46X6	34.502577
S47RY13	35.157094
5625 RR2	35.190462
S49XT07	35.483918

Field Confirmation

Bad luck…

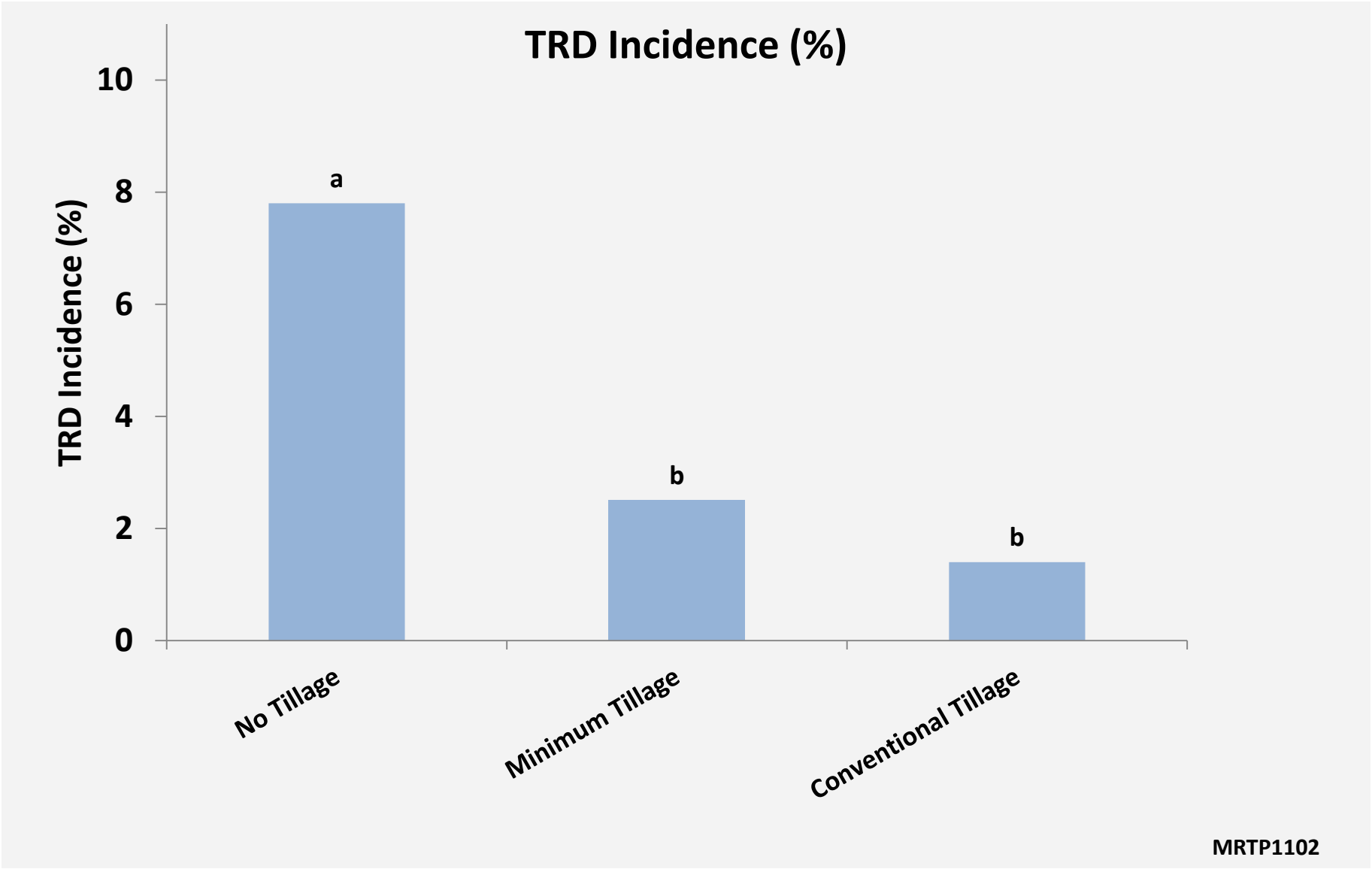
- Complicating factors (natural infection, herbicide damage, chloride toxicity, drought)

Good news…

- Inoculum works
- Height and Yield differences
- All varieties that showed significant height reduction in the field were SUSCEPTIBLE in greenhouse studies
- Varieties deemed RESISTANT in the greenhouse had no significant height reduction in the field

More work is needed…

Effect of tillage on “mystery disease” – 2011 MRRS

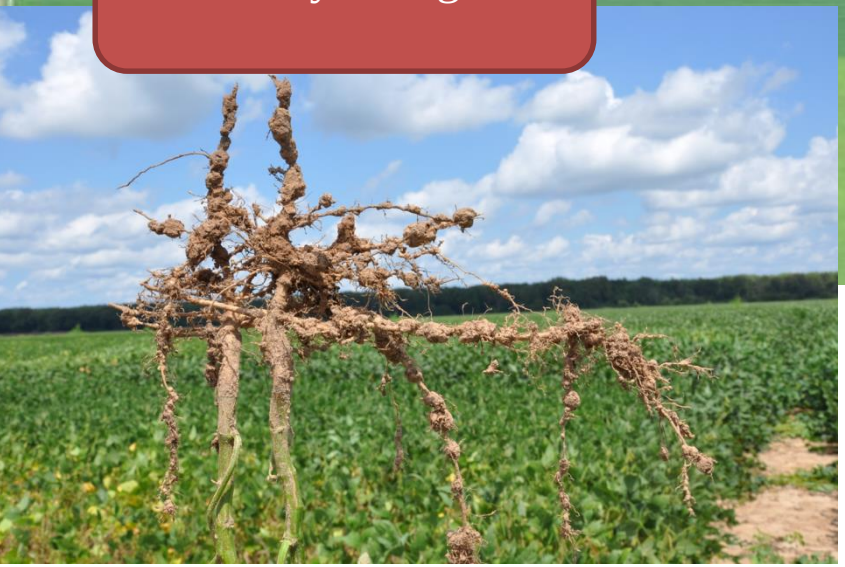


Year	Treatment 1	Treatment 2	Treatment 3	Treatment 4
2016	SB	SB	SB	SB
2017	SB	SB	SB	SB
2018	SB	CN	GS	CT
2019	SB	SB	SB	SB

Southern RKN

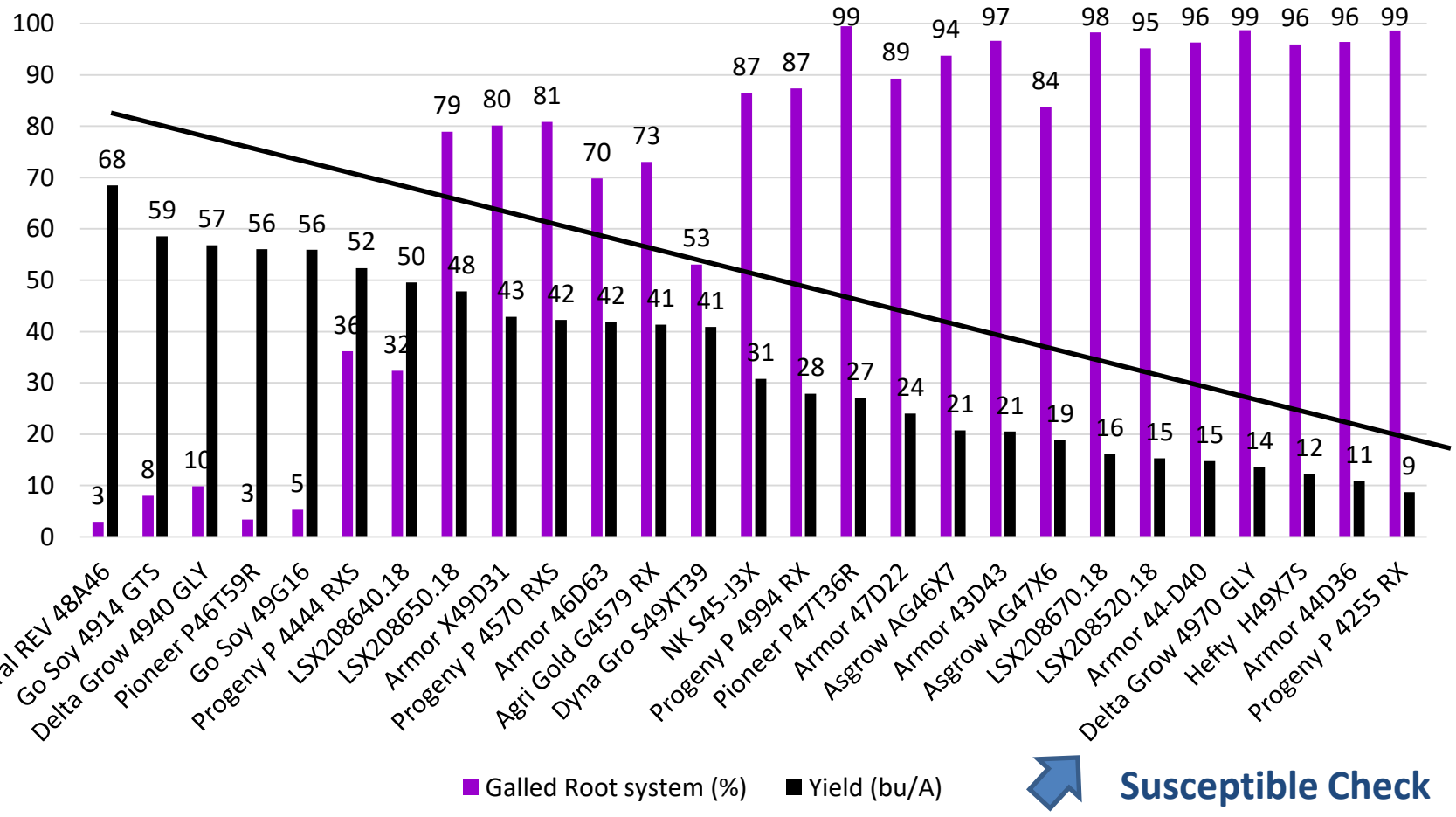
Keo silt loam (58-40-2 = % sand – silt – clay)

% Root system galled



2018 soybean root-knot nematode variety and nematicide trials

MG IV soybean cultivars (RR & Xtend) in southern RKN field near Kerr (2018)



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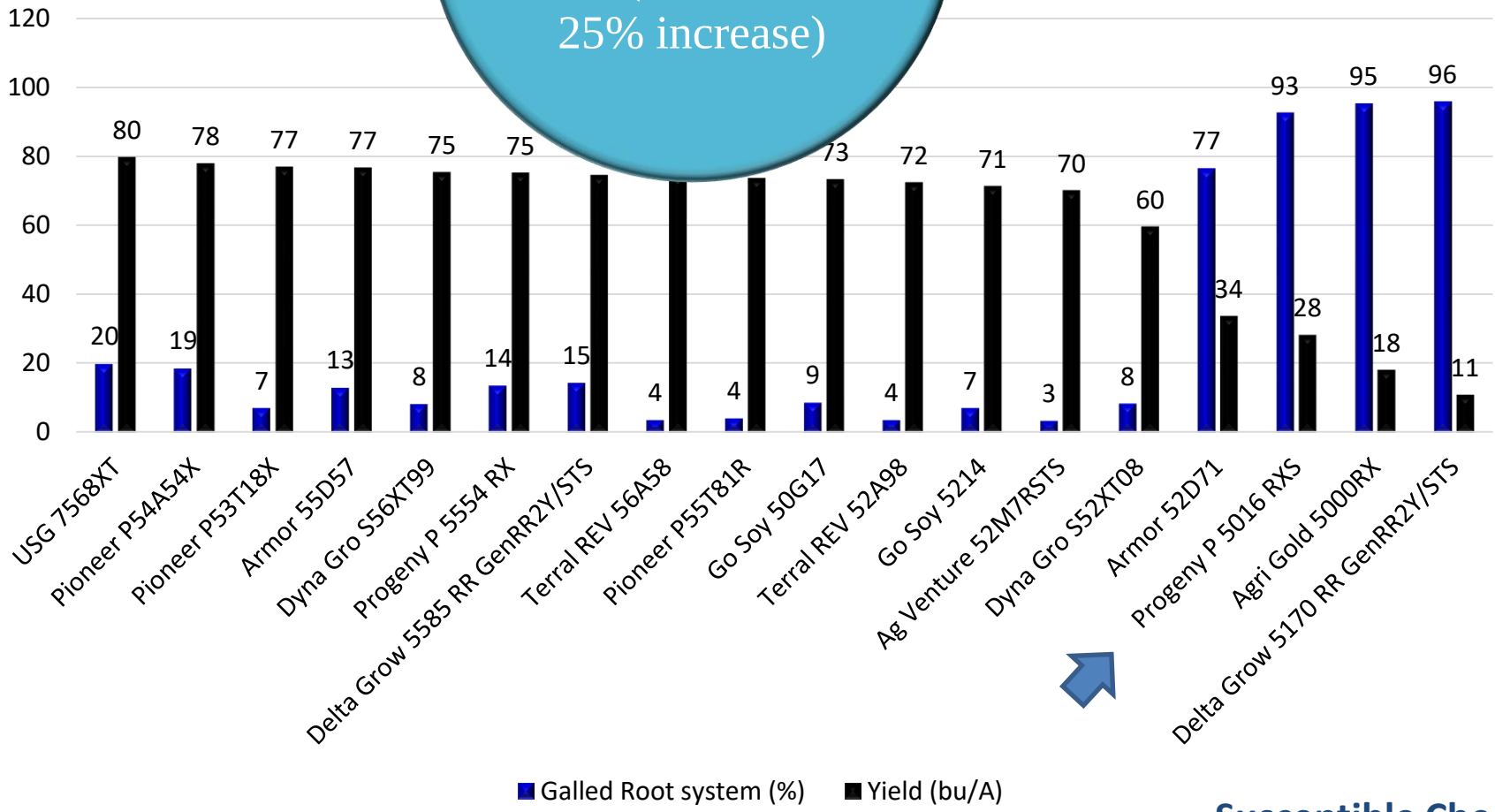
Pi = 60 and Pf = 369 J2/100 cm^3

MG V soybean c… …end) in southern RKN …18)

Overall, these MG V yield better in a RKN field (+15 bu/A = 25% increase)



Susceptible Check

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Pi = 40 and Pf = 395 J2/100 cm^3

Liberty Link

MG IV

- Resistant
  - Pioneer 45A29L
- MR
  - Delta Grow 4977LL/STS
  - Dyna Gro S49LS65

MG V

- MR
  - Pioneer P52A43L
  - Terral REV 54L18

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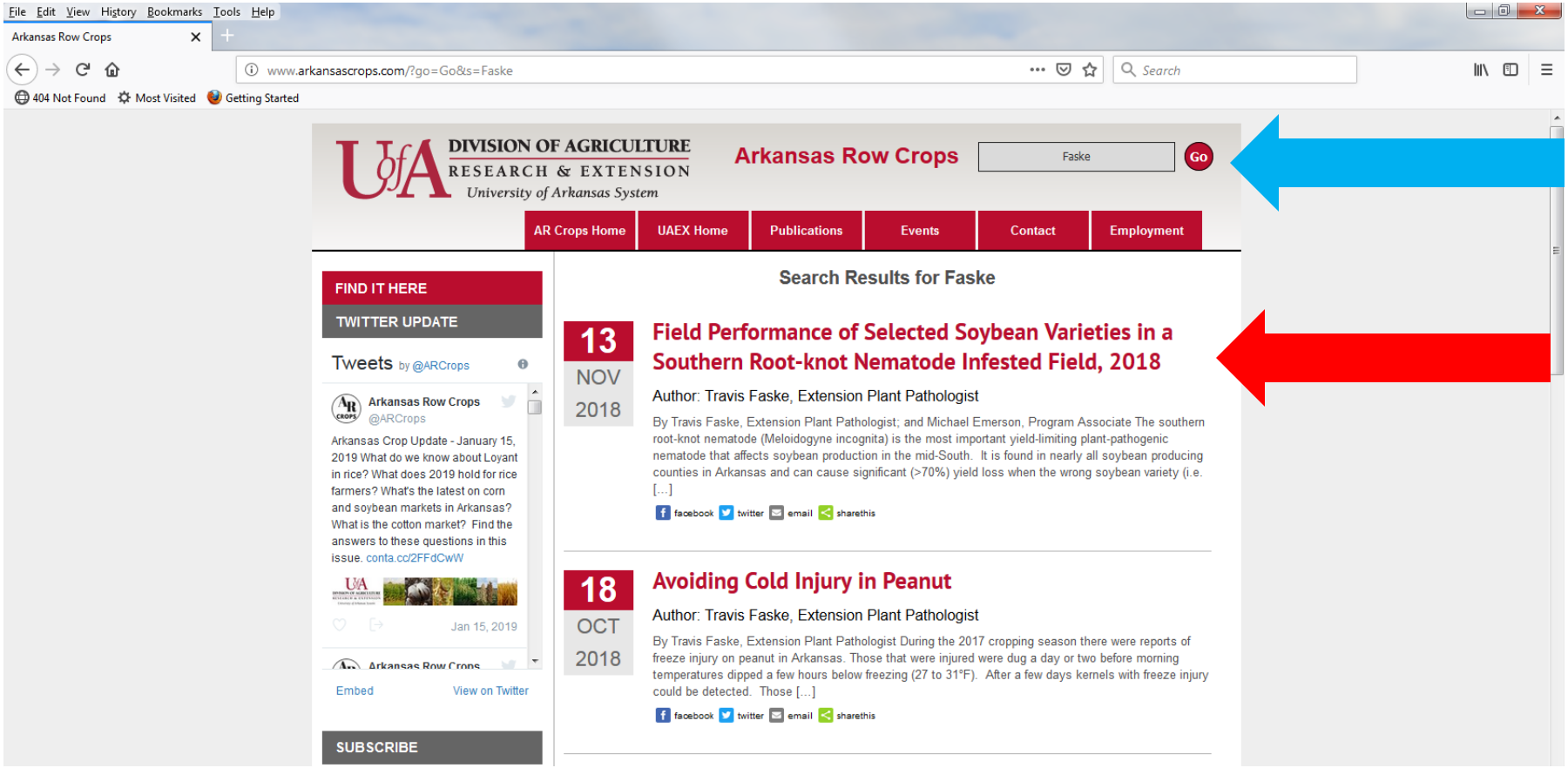
Soybean Varity Response to RKN is on the www.arkansascrops.com website



Dr. Travis Faske

Thank YOU for Supporting Us!

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Rotation with a non-host crop

Southern root-knot nematode
(*Meloidogyne incognita*)

Soybean cyst nematode
(Heterodera glycines)

Reniform nematode
(*Rotylenchulus reniformis*)

Soil- and seed-applied nematicides registered for use in soybean

Trade Name	Active Ingredient	Mode of Action	Signal Word
Avicta	Abamectin	Inhibit nerve transmission	Danger
ILeVO	Fluopyram	SDHI enzyme inhibitor	Caution
NemaStrike ST	Tioxazafen	Mitochondrial translation inhibitor	Caution

Telone II,Vapam, and K-Pam

Avicta, ILeVO, NemaStrike, VOTiVO, BioST, Aveo EZ,, Clariva pn

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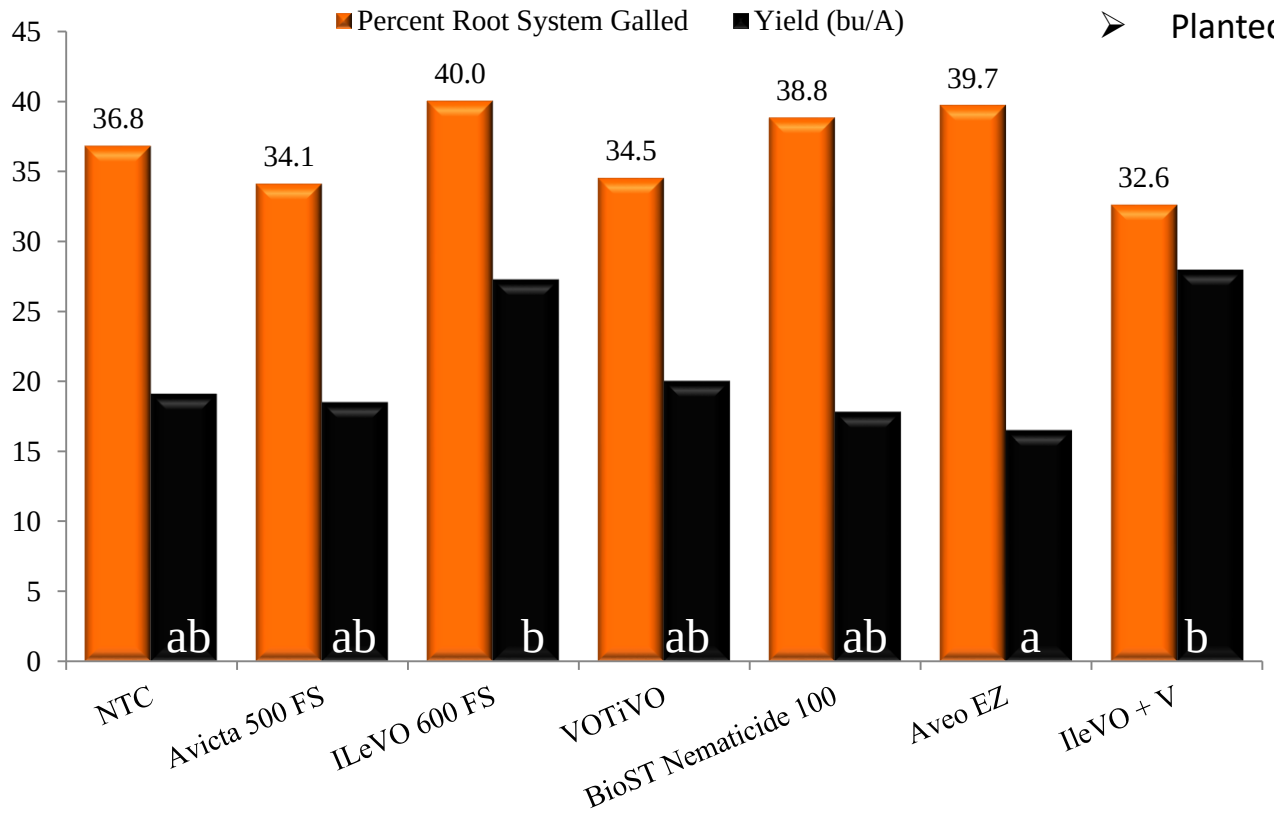
NemaStrike ST	Tioxazafen	Mitochondrial translation inhibitor	Caution
VOTiVO	*Bacillus firmus* I-1582	Repels nema and affects motility	Caution
BioST Nematicide 100	*Burkholderia rinojensis* A496	??	Caution
AVEO EZ Nematicide	*B. amyloliquefaciens* PTA-4838	??	Caution
Clariva *pn*	*Pasteuria nischizawae*	Parasite to SCN only	Caution

Telone II,Vapam, and K-Pam

Avicta, ILeVO, NemaStrike, VOTiVO, BioST, Aveo EZ,, Clariva pn

2018 seed-applied nematicides trial (Kerr field)

- Delta Grow DG 4970
- Planted May 29, 2018

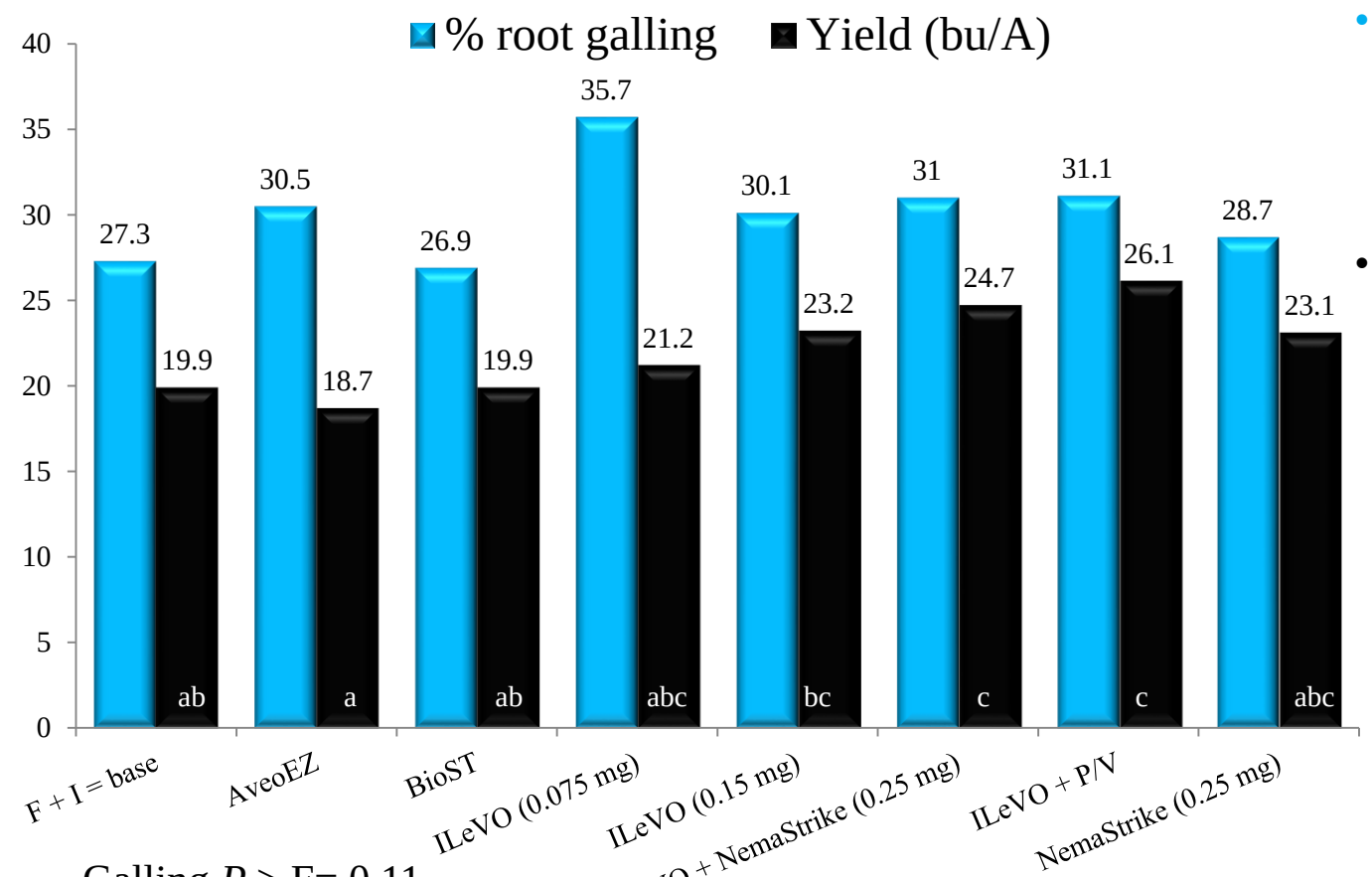


Pi = 32 and Pf = 308 J2/100 cm^3 soil

Galling $P > F = 0.54$
Yield $P > F = 0.03$

Different letters on bars indicant a significant difference at $\alpha = 0.10$ according to Tukey's HSD test

2018 seed-applied nematicide trial (Kerr field)



- **Galling (*P* = 0.72)**
  - AG42x6 = 30.4%
  - AG51x6 = 30.0%
- **Yield (*P* = 0.68)**
  - AG42x6 = 21.8 bu/A
  - AG51x8 = 22.4 bu/A

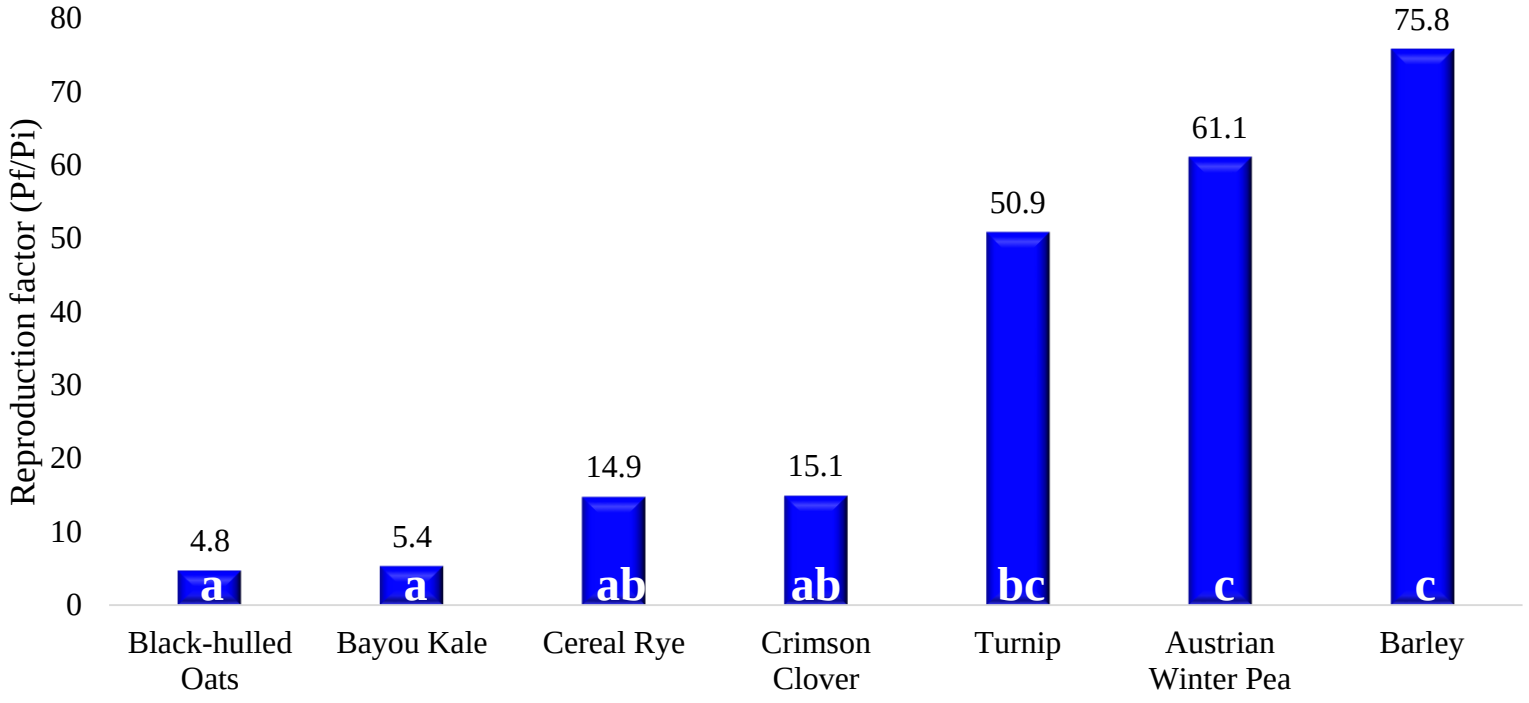
Galling *P* > F= 0.11
Yield *P* > F = 0.085

Pi = 221 and Pf = 368 J2/100 cm^3 soil

Different letters on bars indicant a significant difference at α = 0.10 according to Fishers LSD

Potential reproduction of *M. incognita* on seven cover crops

Each pot was inoculated with 6,000 eggs
Small seeded dicots planted earlier for similar root size
Harvested 60 days after inoculation



Letters on bars indicate a significant difference at $\alpha = 0.05$ according to Tukey's HSD