Corn (and Soybean) Diseases to WATCH in 2020

Tamra Jackson-Ziems

Extension Plant Pathologist

N EXTENSION

Tar Spot

- *Phyllachora maydis*
- and/or *Monographella maydis* in Latin America
- Confirmed in U.S. 2015

Symptoms

- Black dots (ascomata)
- "Fisheye" rings
- < 50% yield loss

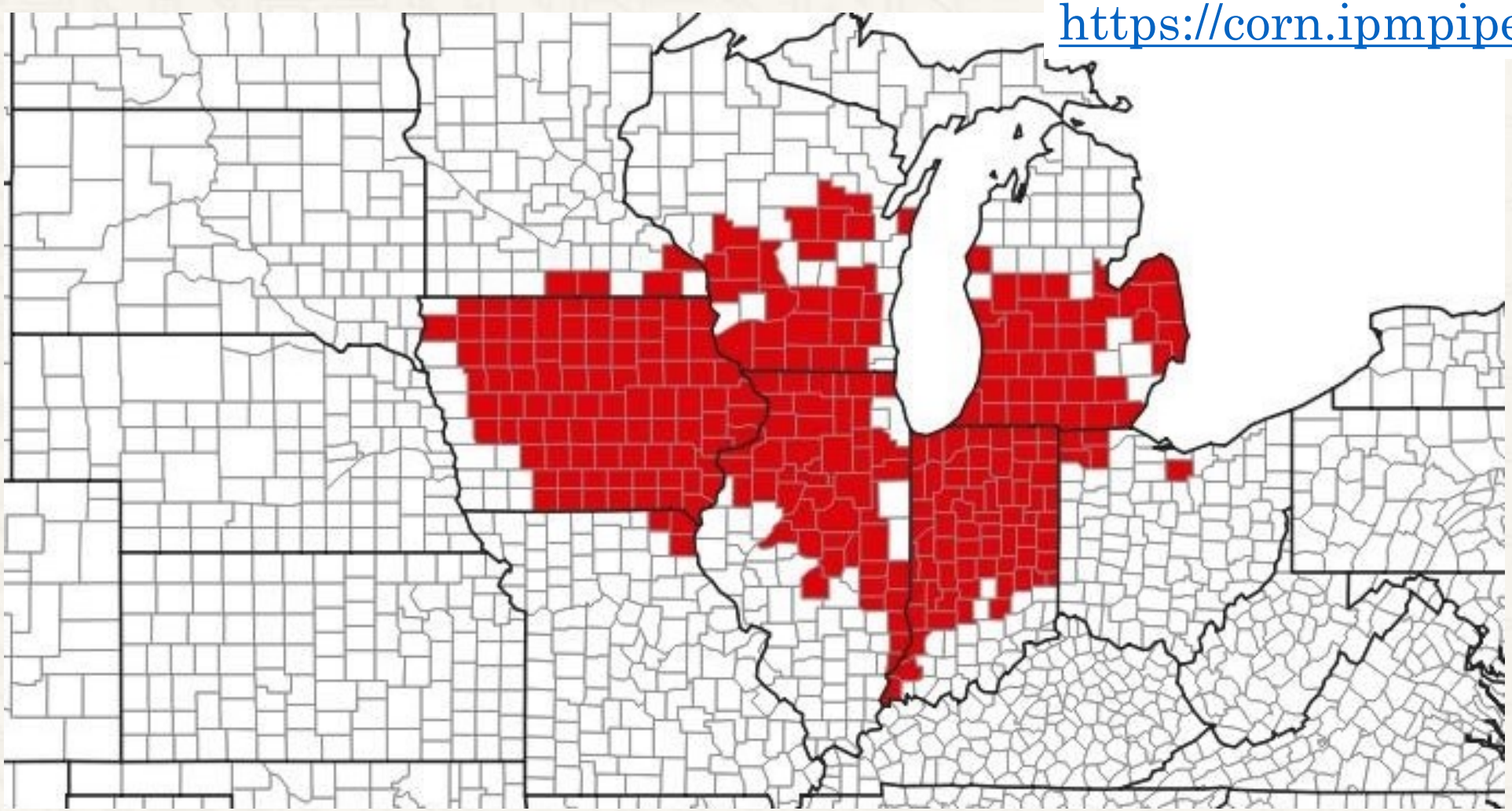

D. Smith, Univ. of Wisconsin


M. Chilvers, Michigan State Univ.

N EXTENSION

2019 Tar Spot in the United States

https://corn.ipmpipe.org/tarspot/



EXTENSION

Tar Spot - The Indiana Story

Tar

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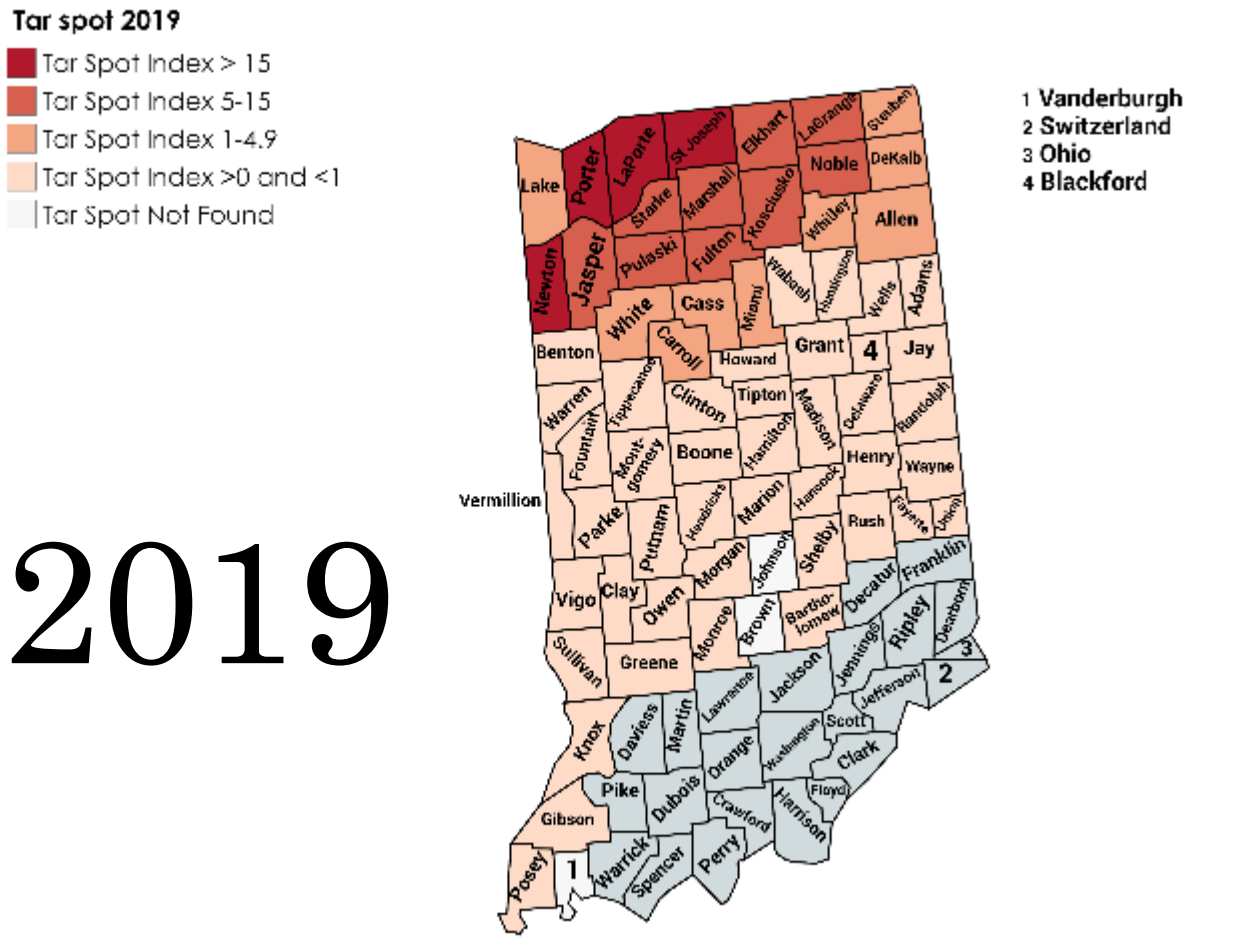
- Tar s
- Dete
  Pest
- 2018
  PPDI
- 2019

DAF
FIELD
DEPA

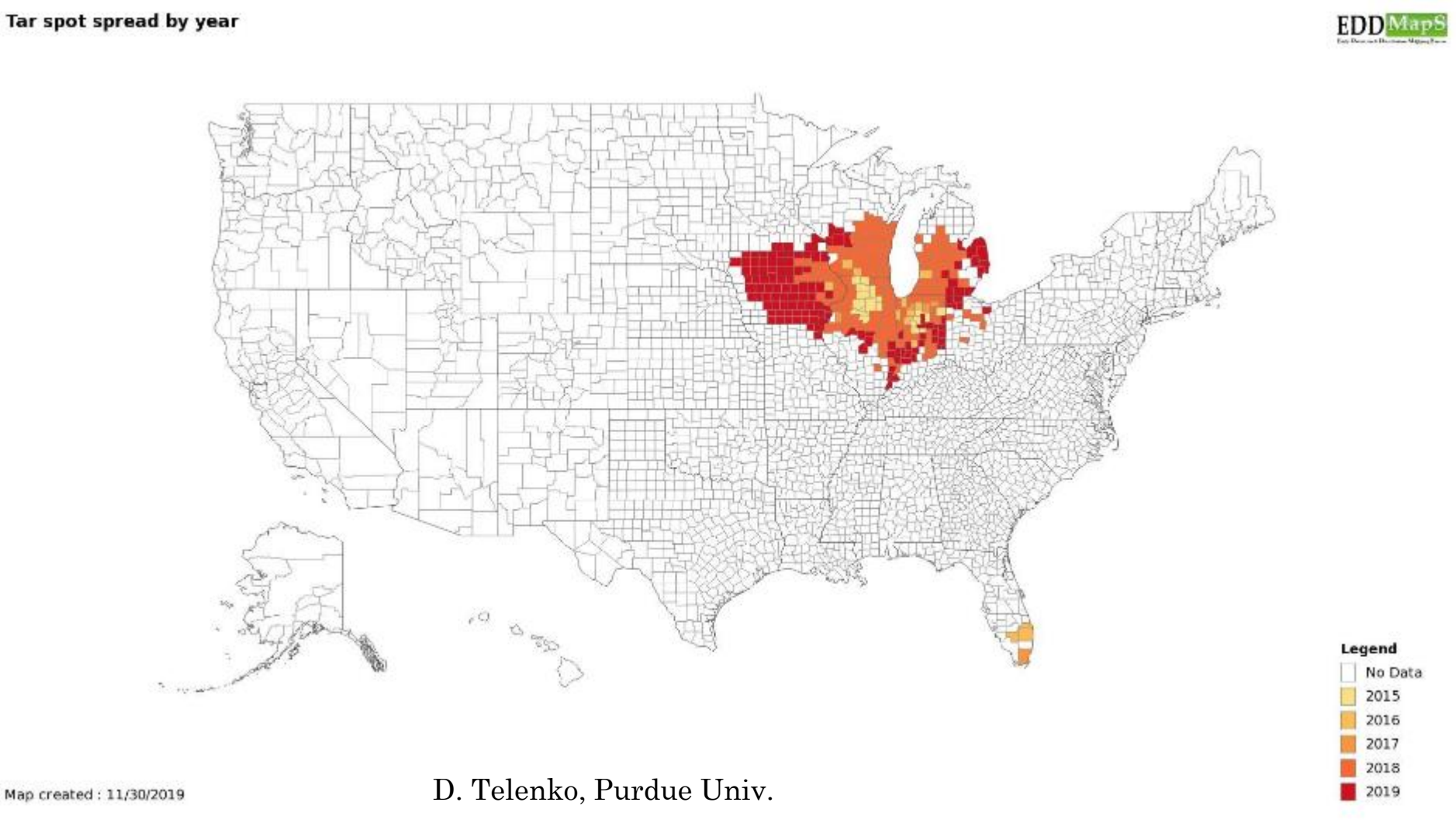


2019

D. Telenko, Purdue Univ.

EXTENSION

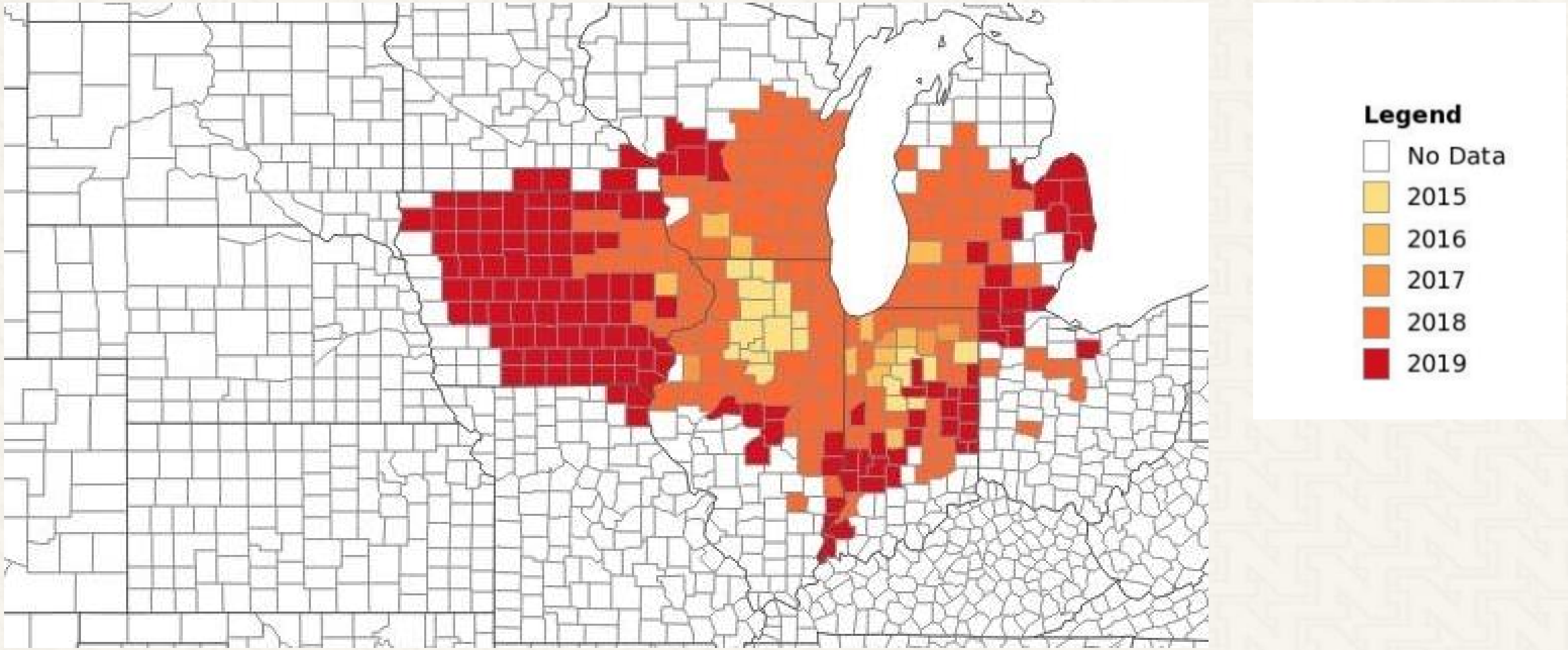
Tar Spot – Expansion in the United States



D. Telenko, Purdue Univ.

EXTENSION

2015-2019 Tar Spot Expansion in the United States



D. Telenko, Purdue Univ.

N EXTENSION

What to watch for: Tar Spot in Nebraska




Send samples to:

UNL Plant & Pest Diagnostic Clinic

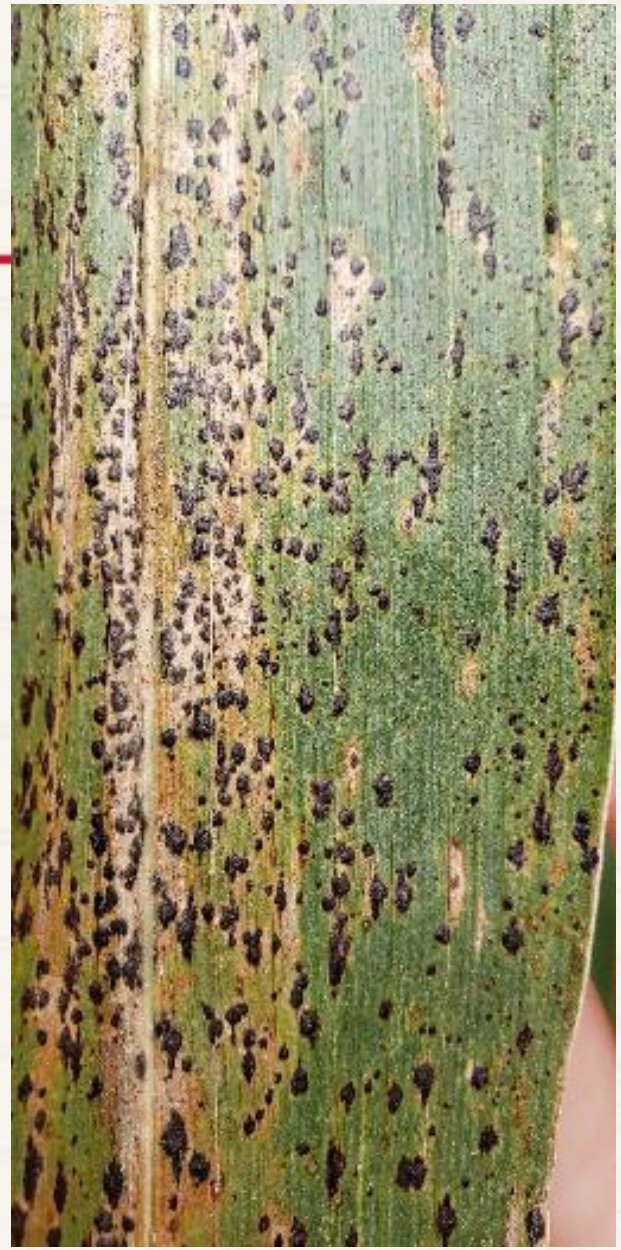
http://go.unl.edu/plantclinic


N EXTENSION

Tar Spot

Management

- Hybrid resistance??
- Cultural practices? Crop rotation? Residue management?
- FUNGICIDES
  - When?
  - How?
  - Which ones?



EXTENSION

Pythium Root Rot of Corn and Soybean

- Important seedling disease
- Causes seed rot, root rot, seedling damping off
- Pythium species require wet conditions
- No plant resistance to Pythium species
- Increasing disease losses in recent years?

N EXTENSION

Pythium Root Rot of Corn and Soybean

Aggressiveness of *Pythium* spp. at various temperatures

Species	55 F	64 F	73 F
P. lutarium	XX	XX	XX
P. oopapillum	XX	X	X
P. sylvaticum	X	XXX	XXX
P. torulosum	XXX	X	X

X – Severity of seed rot and root rot.

Matthiesen, R., L., Ahmad, A. A., and Robertson, A. E. 2016. Plant Disease 100:583-591.

N EXTENSION

Pythium Root Rot of Corn and Soybean

Fungicide sensitivity of *Pythium* spp. at various temperatures

Species	Metalaxyl			Ethaboxam			Captan			Thiram			Azoxystrobin			Pyraclostrobin			Trifloxystrobin		
P. lutarium	a	a	a	a	a	a	a	a	a	a	a	a	b	✗	a b	a b	b	✗	a	a	a
P. oopapillum	a	a	a	a	a	a	✗	a b	b	a	a	a	✗	a b	b	✗	a b	b	✗	a b	b
P. sylvaticum	b	a b	✗	b	a b	✗	b	a b	✗	b	a b	✗	b	a b	b	b	a b	✗	b	a b	b
P. torulosum	✗	a b	b	✗	a b	b	✗	a b	b	✗	a b	b	✗	a b	b	✗	a b	b	✗	a b	b

EC50 – fungal concentration required to reduce growth by 50% at 55 F, 64 F, 73 F.

Matthiesen, R., L., Ahmad, A. A., and Robertson, A. E. 2016. Plant Disease 100:583-591.

N EXTENSION

Bacterial leaf streak

History

- Caused by *Xanthomonas vasicola* pv. *vasculorum*
- Confirmed in 2016 in Nebraska (first time in the U.S.)

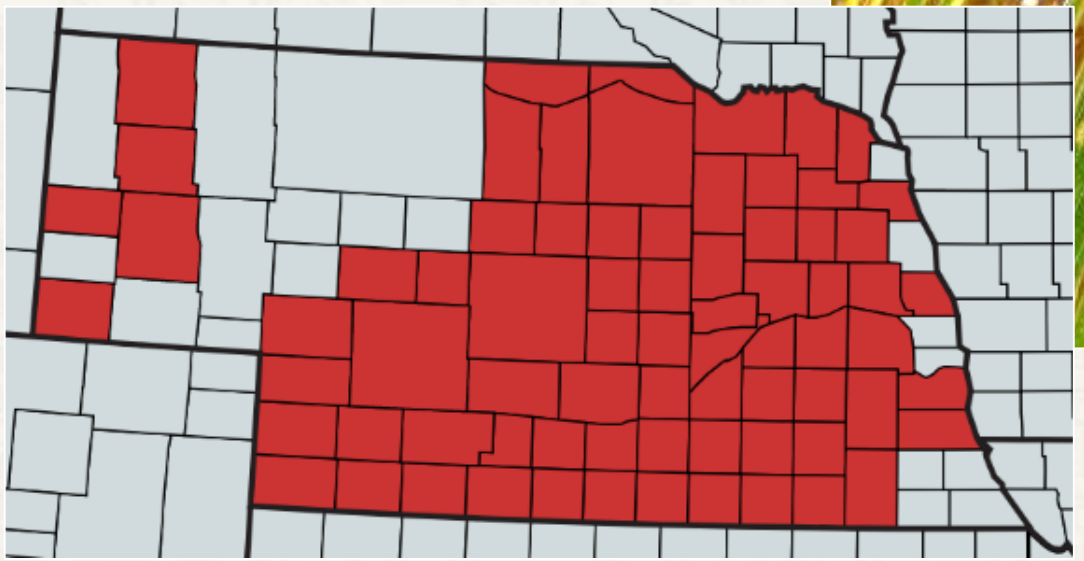
Symptoms

- Interveinal brown to yellow streaks
- Appear strikingly yellow when backlit
- May develop on the **lower leaves initially**
- May develop **mid- to upper canopy later**

EXTENSION

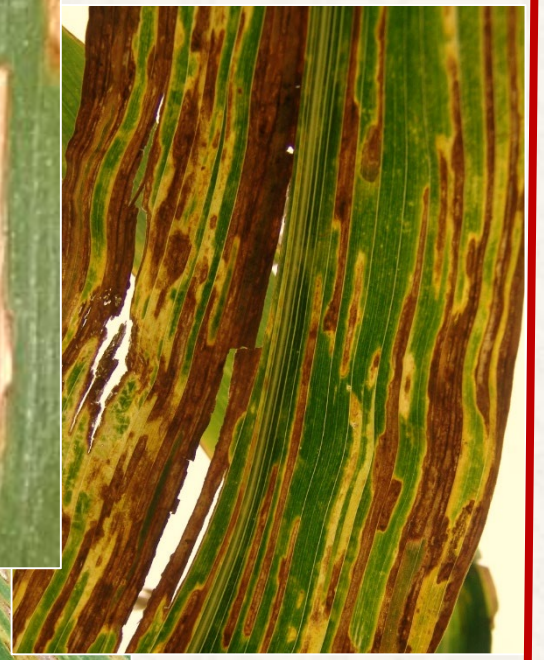
Bacterial leaf streak

- 74 NE counties confirmed since 2016
- Misidentification as gray leaf spot (and other diseases) has led to misapplication of foliar fungicides

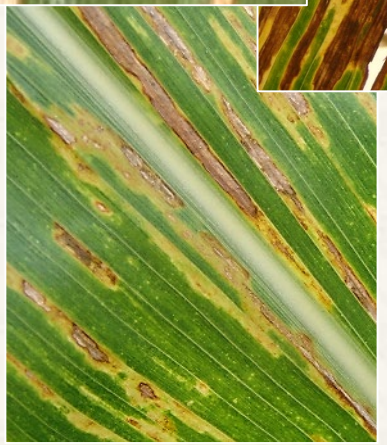


Hartman, T. M. 2018. University of Nebraska-Lincoln. M.S. Thesis

Bacterial Leaf Streak



backlit



Gray Leaf Spot (fungal)

backlit

EXTENSION

Bacterial Leaf Streak (BLS) of Corn

- Caused by *Xanthomonas vasicola* pv. *vasculorum*
- Other reported hosts:
  - Several palm and grass species
  - Coconut
  - Sorghum species
  - Grain sorghum
  - Johnson- and Sudan grass

Lang, J.M., E. DuCharme, J. Ibarra Caballero, E. Luna, T. Hartman, M. Ortiz-Castro, K. Korus, J. Rascoe, T.A. Jackson-Ziems, K. Broders, and J.E. Leach. 2017. Detection and characterization of *Xanthomonas vasicola* pv. *vasculorum* nov. causing bacterial leaf streak of corn in the United States. Phytopathology (*accepted June 2017*).

N EXTENSION

Host Range Testing

ANNUAL CEREAL CROPS*		
Symptomatic**	**Asymptomatic**	**Non-hosts**
Oat, 'Jerry'	None	Barley
Rice, 'Jupiter'		Switchgrass
		Cereal rye
		Foxtail millet
		Wheat
		Triticale

*greenhouse
**2017 field tests

Hartman et al., 2019. Phytopathology. (*accepted*)

N EXTENSION

Host Range Testing

Perennial Pasture, Turf and Landscape Plants*

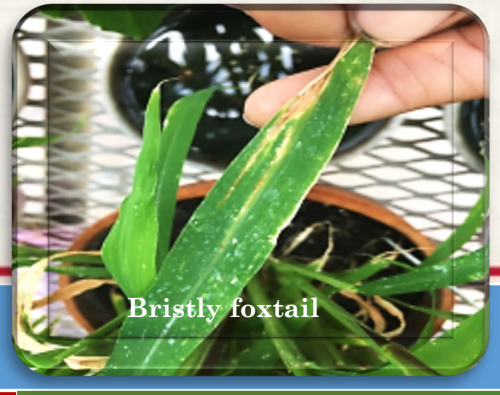
Symptomatic**	Asymptomatic	Non-hosts
Big bluestem***, 'Champ'	Tall fescue	Annual ryegrass, bluegrama, creeping bentgrass, creeping foxtail, crested wheatgrass, festulolium, green needle, junegrass, meadow brome, prairie sandreed, pubescent wheatgrass, reed canary, sand dropseed, sideoats grama, slender wheatgrass, tall wheatgrass, thickspike wheatgrass, Virginia wild rye, bermudagrass, buffalograss, daylily, Kentucky bluegrass, ornamental pearl millet, perennial ryegrass, zoysiagrass
Indiangrass, 'Holt'	Western wheatgrass	
Little bluestem, 'Blaze'		
Orchardgrass, 'Latar'		
Sand blustem		
Timothy, 'Climax' 	Reproduction of Xvv bacteria without causing visible disease symptoms	

*greenhouse testing, **2017 field tests, ***symptomatic in field tests

Hartman et al., 2019. Phytopathology. (*accepted*)

N EXTENSION

Host Range Testing



WEEDS*		
Symptomatic**	**Asymptomatic**	**Non-hosts**
Bristly foxtail***	Downy brome	Palmer amaranth
Green foxtail		Smooth brome
Johnsongrass		Sandbur
Shattercane		Large crabgrass
Yellow nutsedge	Reproduction of Xvv bacteria without causing visible disease symptoms	Barnyard grass
<u>NOT A GRASS</u> Cyperaceae DIFFERENT plant family		Fall panicum
		Giant foxtail
		Yellow foxtail

*greenhouse testing, **2017 field tests, ***symptomatic in field tests

Hartman et al., 2019. Phytopathology. (*accepted*)

N EXTENSION

Bacterial leaf streak

- Management
  - Hybrid selection – screening is difficult. Consult seed company reps
  - Crop rotation
  - Residue management or tillage *(as appropriate)*
  - Weed management?

EXTENSION

Bacterial leaf streak

- Additional experiments are underway
  - Yield loss estimates
  - Mitigation experiments
    - Impacts of tillage x crop rotation
    - Screening for resistance in USDA GEM lines

Physoderma Brown Spot

- *Physoderma maydis* (fungus)
- More common in 2019
- Infection requires water, esp. early season during whorl stages

Symptoms

- Yellow/tan lesions on leaf blade and/or
- dark purple/black lesions in midrib, leaf sheath, collar, etc.
- No spores rub off on fingers

N EXTENSION

Physoderma Brown Spot

Node Rot

- Infections around the rind lead to brittle stalks
- Affects certain hybrids
  - Not necessarily those with severe leaf disease

Management

- Hybrid selection
- Limited evidence – foliar fungicide within 7 days after inoculation (V8)

Personal communication, A. Robertson, ISU

N EXTENSION

Ear Rot Diseases

- Common in late 2019
- Cool wet conditions delayed harvest and supported development of several diseases
- Some ear rot diseases will impact grain quality.
  - Continue to monitor stored grain for evidence of spoilage

N EXTENSION

Soybean Disease Update

Tamra Jackson-Ziems
Extension Plant Pathologist

EXTENSION

Frogeye Leaf Spot

- *Cercospora sojina* (fungus)
- Most soybean-producing areas of the U.S.

Symptoms

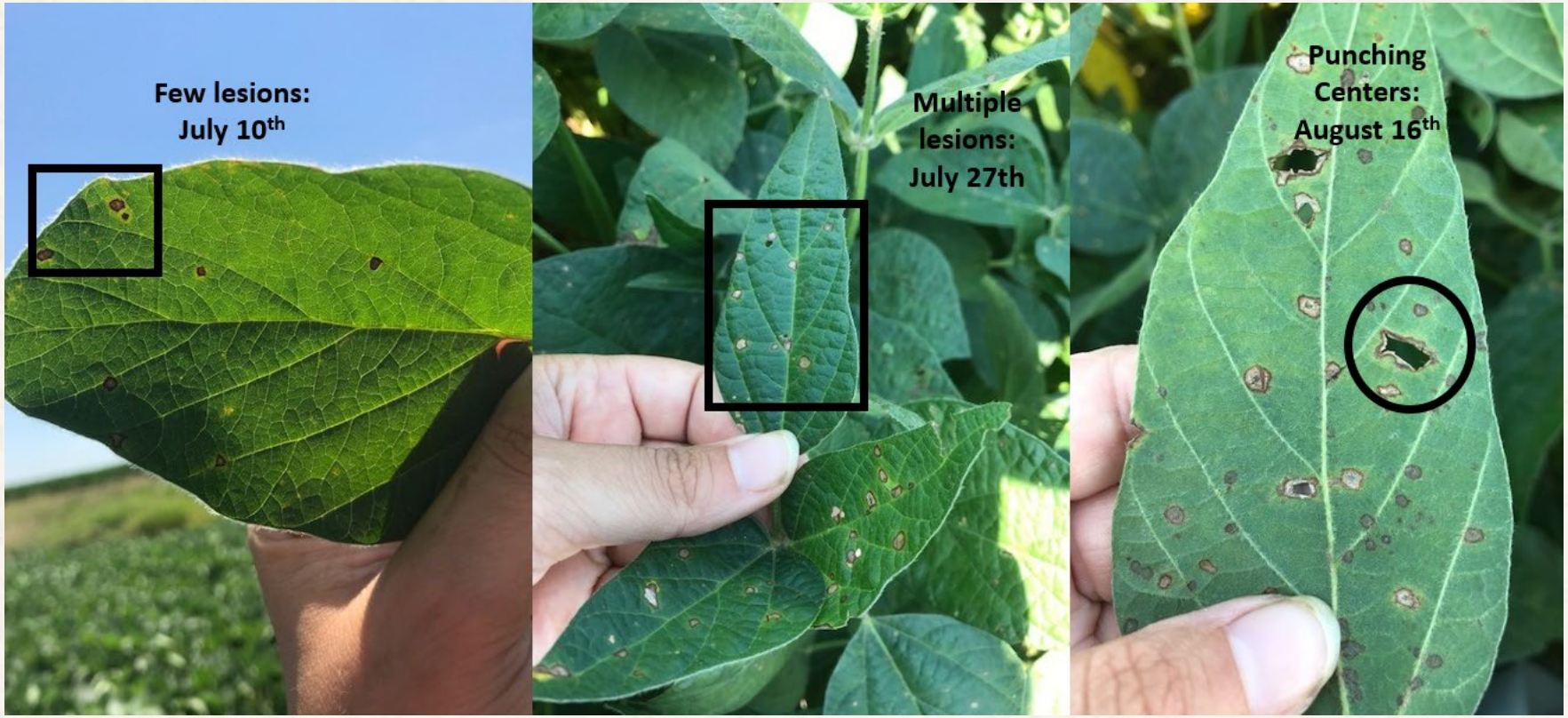
- Small tan/gray lesions
- Red/purpose border
- Upper leaves

Favorable Conditions

- Warm, moist/humid

N EXTENSION

Progression of Frogeye Leaf Spot



Courtesy of Nathan Mueller, Nebraska Extension

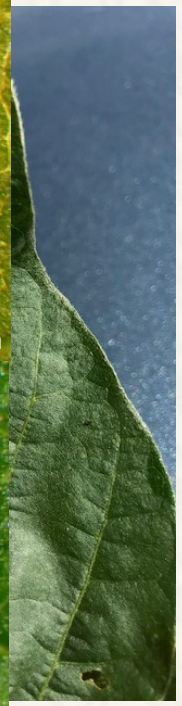
N EXTENSION

Frogeye Look-alikes

Courtesy of Nathan Mueller, Nebraska Extension

Frogeye leaf spot

Phyllosticta leaf spot



cta

Target Spot

Alternaria

<u>Bottom Line:</u>

Lab testing is key to proper identification

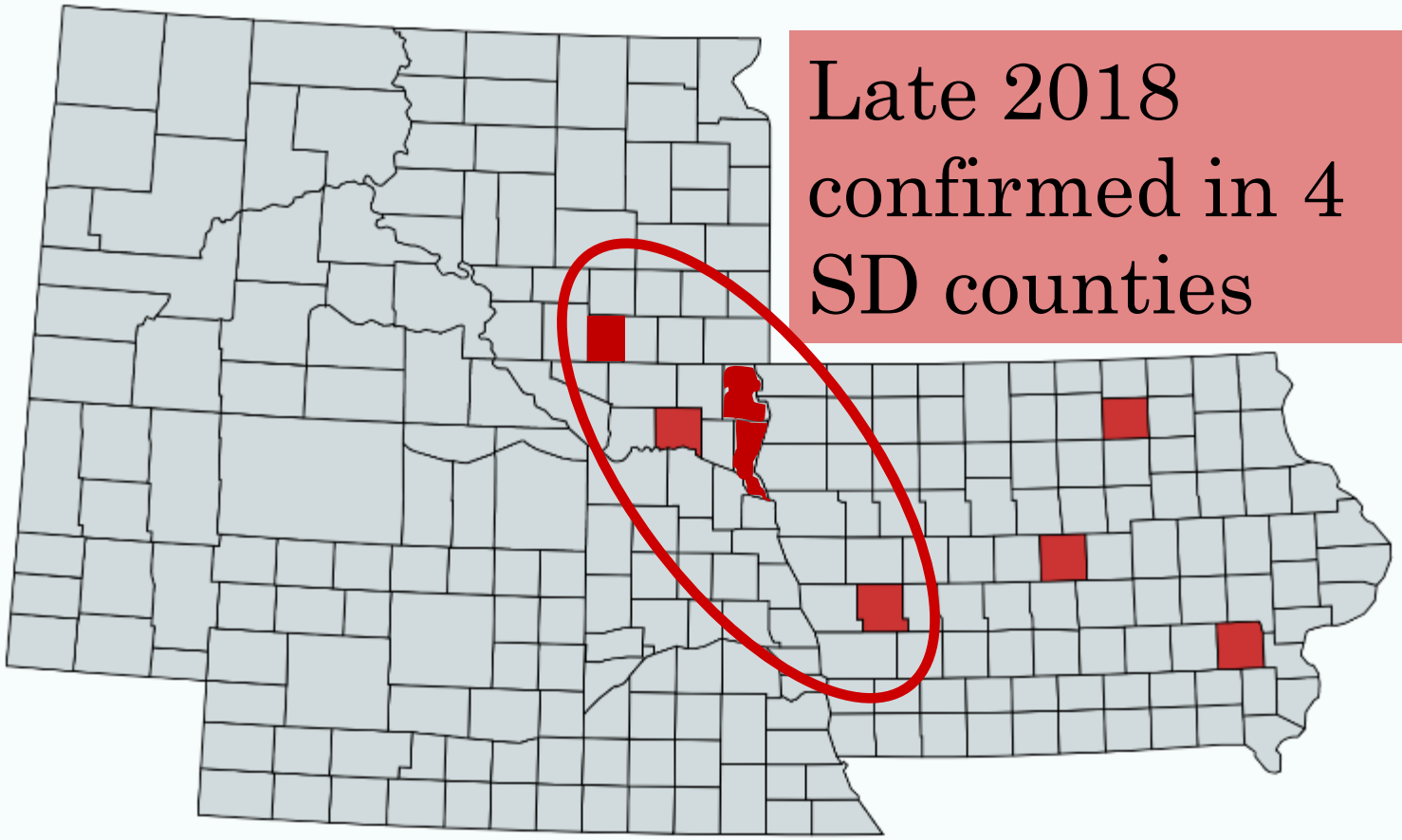
N EXTENSION

Frogeye Leaf Spot Management

- Variety genetic resistance
- Fungus overwinters in residue and is more severe in continuous soybean and no-till production systems.
- Fungicides can increase yields if applied at growth stage R3- R5. Products containing a QoI (strobilurin) fungicide usually provide better control of this disease.
  - Resistance to QoI fungicides becoming more common in other states
- ***NOTE – If you see reduced effects of fungicides – please contact us or collect/send samples for advanced testing

N EXTENSION

U.S. Counties and Year QoI Fungicide Resistance confirmed in *Cercospora sojina* causing Frogeye Leaf Spot



WATCH OUT!

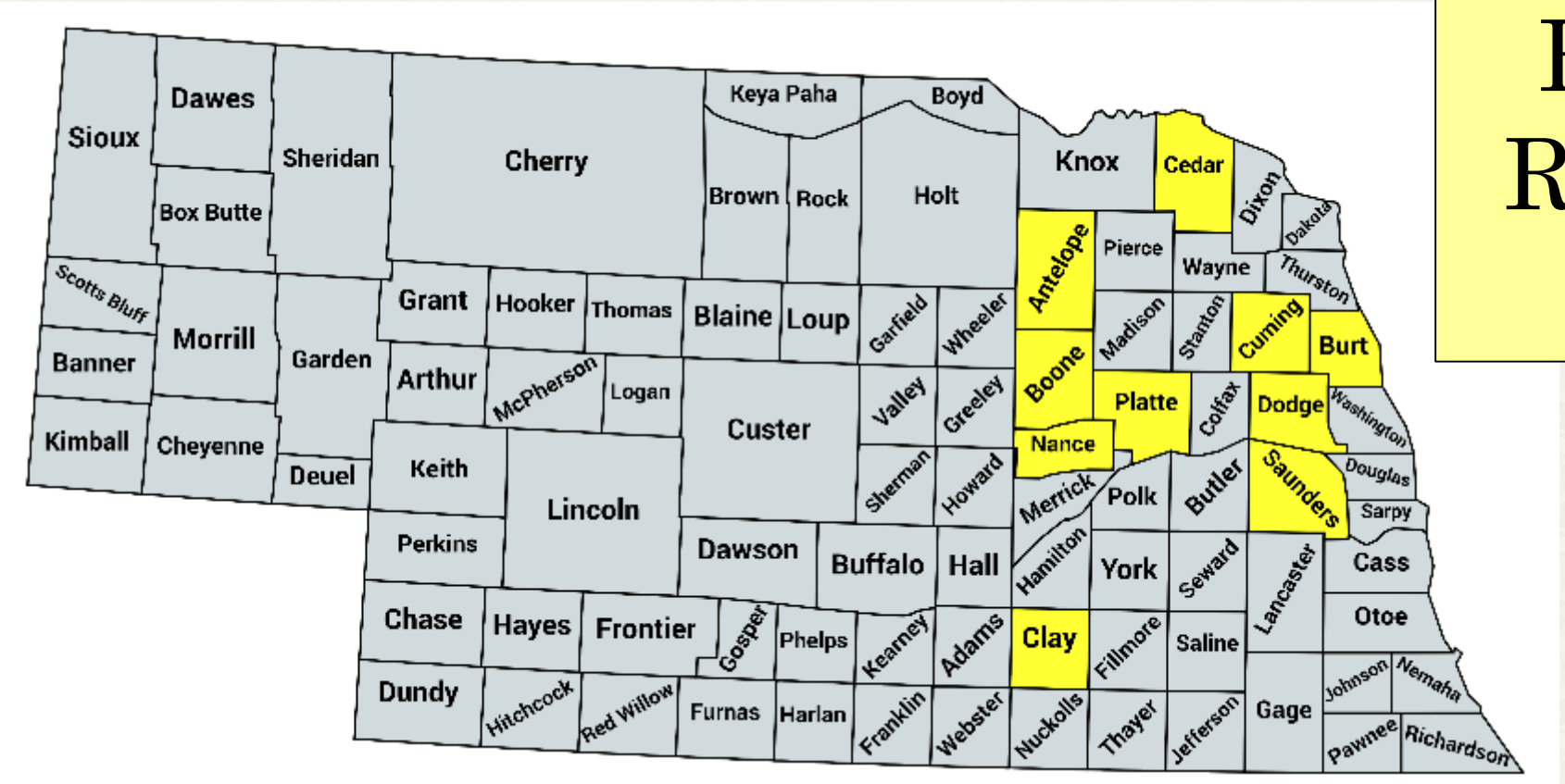
Resistance may already be here!

#IRPests

of Quinone Outside Inhibitor Fungicide-
cospora sojina, Causal Agent
Soybean, in the United States. G. Zhang, et
rogress 19:295-302.
HP-04-18-0016-RS

N EXTENSION

2019 - QoI Fungicide Resistance Confirmed in *Cercospora sojina* causing Frogeye Leaf Spot in 10 Nebraska Counties



FUNGICIDE RESISTANCE IS HERE!

Resistance confirmed in 111 out of 113 *C. sojina* isolates (98%)

#IRPests

Neves, D., Jackson-Ziems, T., and Bradley, C. 2019.

N EXTENSION

Frogeye Leaf Spot Management – what to do when you have QoI fungicide resistance

- Never use fungicides with active ingredients from single class or mode of action
- Combine management strategies for most effective management
- Frogeye resistant soybean varieties
- Longer crop rotations
- Use of foliar fungicides with active ingredients from 2-3 classes and modes of action

N EXTENSION

Fungicide Efficacy for Management of Frogeye Leaf Spot

From the Disease Management Section of the 2020 Guide for Weed, Disease, and Insect Management and the North Central Regional Committee on Soybean Diseases NCERA-137

Fungicides			Rating
Class	Trade Name Active Ingredient (%)	Rate[1] (per acre)	
MBC Thiophanates (Group 1)	Topsin 4.5FL Thiophanate-methyl 45.0%	10.0-20.0	
	Topsin M WSB Thiophanate-methyl 70.0%	0.5-1.0 lb	VG
DMI Triazoles (Group 3)	Alto 100SL Cyproconazole 8.9%	2.75-5.5	F
	Bumper 41.8 EC Propioconazole 41.8%	4.0-6.0	
	Bumper ES Propioconazole 40.85%	4.0-6.0	
	Domark 230 ME Tetraconazole 20.5%	4.5-5.0	G-VG
	Proline 480 SC Prothioconazole 41.0%	2.5-5.0	G-VG
	Tilt Propiconazole 41.8%	4.0-6.0	F
	Topguard Flutriafol 11.8%	7.0-14.0	VG

			Rating
	Flutriafol 11.8%		
SDHI Carboximides (Group 7)	Endura Boscalid 70.0%	3.5-11.0	P
	Vertisan Penthiopyrad 20.6%	10.0-30.0	
QoI Strobilurins (Group 11)	Aftershock / Evito 480 SC Fluoxastrobin 40.3%	2.0-5.7	P
	Aproach Picoxystrobin 22.5%	6.0-12.0	P
	Headline Pyraclostrobin 23.6% Headline SC Pyraclostrobin 23.3%	6.0-12.0	P
	Quadris Flowable / Satori Azoxystrobin 22.9%	6.0-15.5	P
2, 6-dinitro-anilines (Group 29)	Omega 500F Fluazinam 40.0%	12.0-16.0	NL
Mixed Modes of Action 3+11	Affiance Azoxystrobin 9.35% + Tetraconazole 7.48%	10.0-14.0	G-VG
	Aproach Prima Cyproconazole 7.17% + Picoxystrobin 17.94%	5.0-6.8	F-G
	Avaris / Quilt Azoxystrobin 7.0% + Propiconazole 11.7%	14.0-20.5	F
Mixed Modes of Action 3+7	Lucento Flutriafol 26.5% Bixafen 15.6%	3-5.5	

N EXTENSION

Fungicide Efficacy for Management of Frogeye Leaf Spot

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Fungicides			Rating
Class	Trade Name Active Ingredient (%)	Rate[1] (per acre)	
3+11	Delaro Protioconazole 16.0% + Trifloxystrobin 13.7%	7.0-11.0	G-VG
	Evito T Fluoxastrobin 18.0% + Tebuconazole 25.0%	4.0-6.0	
	Fortix / Preemptor Flutriafol 19.3% + Fluoxastrobin 14.84%	4.0-6.0	VG
	Quadris Top SB Azoxystrobin 18.2% + Difenconazole 11.4%	8.0-14.0	
	Quadris Top SBX Azoxystrobin 19.8% + Difenconazole 19.8%	7.0-7.5	VG
	Quadris Xtra Azoxystrobin 18.2% + Cyproconazole 7.3%	4.0-6.8	
	Quilt Xcel Azoxystrobin 13.5% + Propiconazole 11.7%	10.5-21.0	F
	Stratego YLD Prothioconazole 10.8% + Trifloxystrobin 32.3%	4.0-4.65	F-G
	Topguard EQ Azoxystrobin 25.3% + Flutriafol 18.6%	5.0-7.0	G-VG
	Veltyma Mefentrifluconazole 17.56% Pyraclostrobin 17.56%	7-10	
	Zolera FX Fluoxastrobin 17.76% + Tetraconazole 17.76%	4.4-6.8	G-VG

			Rating
7+11	Priaxor Fluxapyroxad 14.33% + Pyraclostrobin 28.58%	4.0-8.0	P-F
1+3	Topsin XTR2 Tebuconazole 7.5% + Thiophanate-methyl 37.5%	20	
3+7+11	Miravis Neo Propiconazole 11.6% Pydiflumetofen 7.0% Azoxystrobin 9.3%	13.7-20.8	
	Priaxor D Component A Fluxapyroxad 14.33% + Pyraclostrobin 28.58%	4.0	G-VG
	Component B Tetraconazole 20.5%	4.0	
	Revytek Mefentrifluconazole 11.61% Pyraclostrobin 15.49% Fluxapyroxad 7.74%	8-15	
	Trivapro Benzovindiflupyr 2.9% + Azoxystrobin 10.5% + Propiconazole 11.9%	13.7-20.7	G
	Trivapro Co-Pack Trivapro A Benzovindiflupyr 10.27%	4.0	
	Trivapro B Azoxystrobin 13.5% + Propiconazole 11.7%	10.5	

N EXTENSION

Crop Disease Resources

- Crop Watch - http://cropwatch.unl.edu/
  - Newsletter, efficacy trial data, and publications
- Market Journal – weekly episode or see videos at: http://marketjournal.unl.edu/
- Videos – YouTube – UNL CropWatch channel
  - short Corn and Soybean Disease videos
- Crop Protection Network http://cropprotectionnetwork.org
- Tamra Jackson-Ziems on Twitter - @tjcksn
- Contact local county Extension office

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