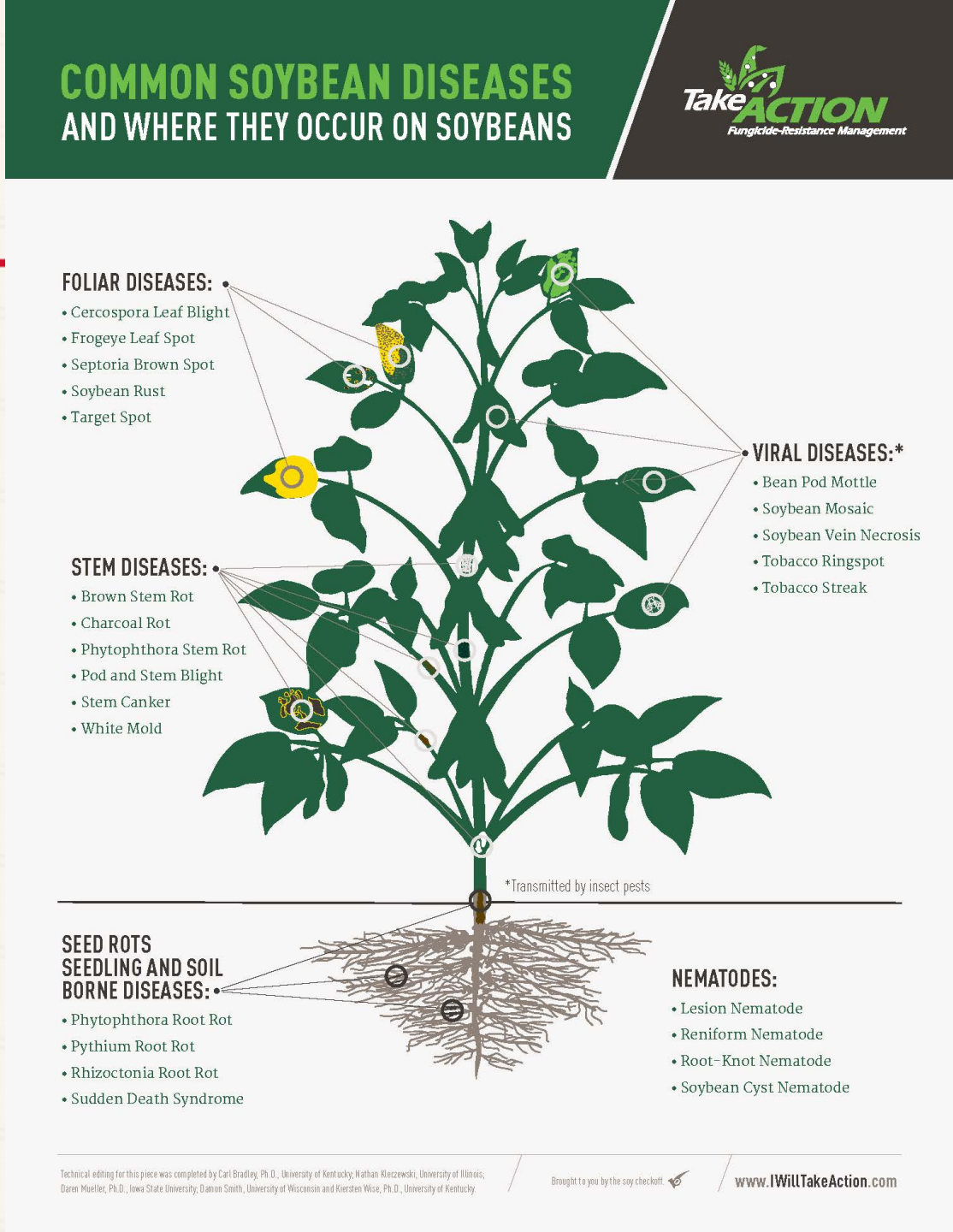
Soybean Diseases

- What soybean diseases are you the most concerned about?



Frogeye Leaf Spot Management in a New Decade

Nebraska Extension:
Nathan Mueller, Megan Taylor, Tamra Jackson-Ziems, and Loren Giesler

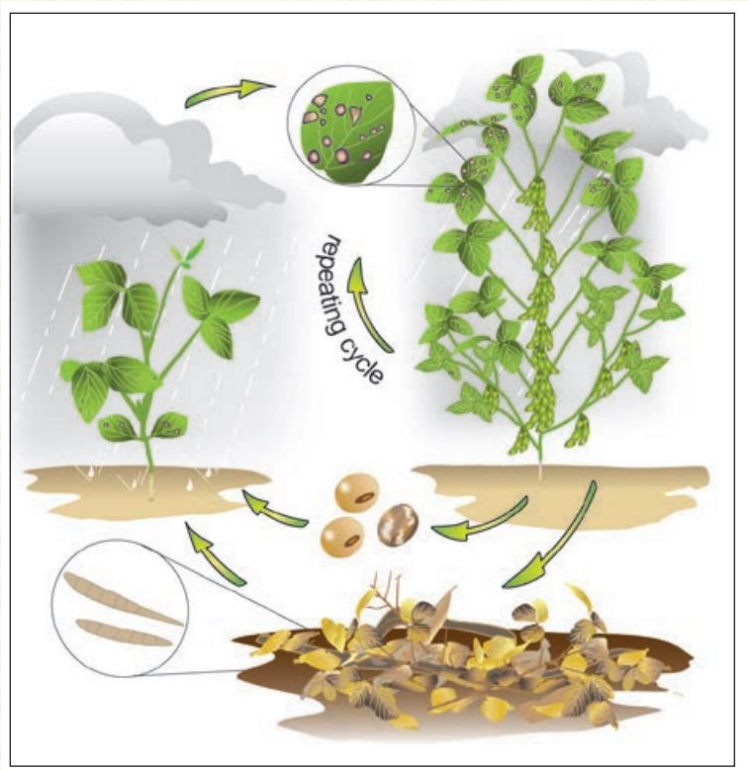
EXTENSION

Goals for Us

- Increase my knowledge of frogeye leaf spot
  - Pathogen, disease cycle, and disease triangle
  - Identification
  - Fungicide resistance
- Increase my knowledge of best management practices
  - Variety selection, crop rotation/residue, fungicide selection and resistance management
  - Resources to utilize
  - Developing your 2020 farm plan

Pathogen and Disease Cycle

- Caused by the fungal pathogen *Cercospora sojina*
- Disease survives in residue and in infected seed
- Wind and rain spread inoculum (fungal spores) to soybean plants where infection occur
- Disease cycle repeats, and spores spread to new leaves, plants, and fields
- Infection at any stage, but usually after flowering, upper canopy on new leaves
- Stems and pods can be infected later in the season



Source: Soybean Disease Management CPN-1017 Frogeye Leaf Spot

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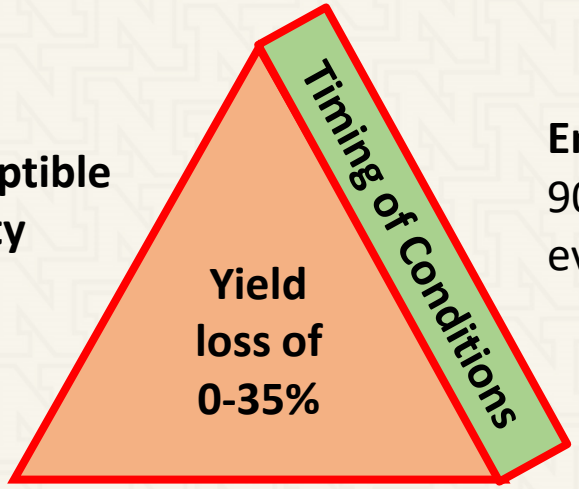
Pathogen and Disease Cycle

Susceptible Variety

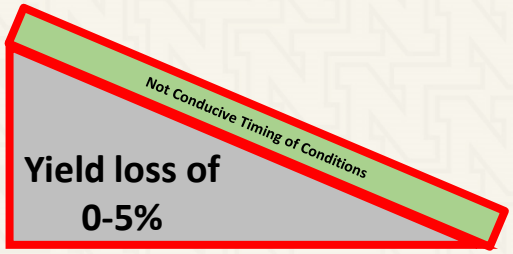


Pathogen:
(*Cercospora sojina*)
High Risk:
Continuous soybean plus no-till

Environmental Conditions (70-80-85 °F & 90% relative humidity, frequent rainfall events, 48 to 72 hours of leaf wetness)

Environmental Conditions

Moderately Resistant Variety



Pathogen
(***Cercospora sojina***)

Frogeye Leaf Spot Identification

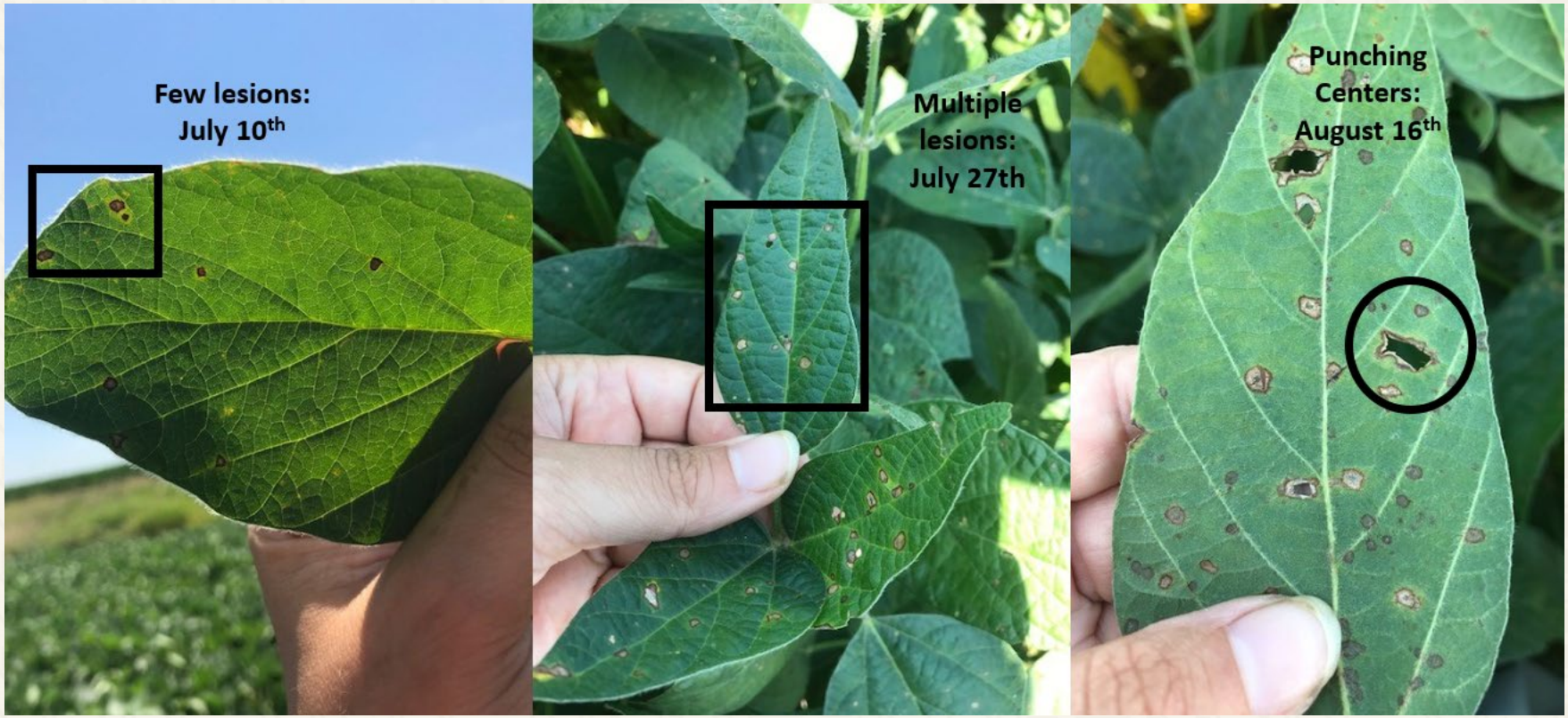
EXTENSION

Frogeye Leaf Spot Identification

1. Infection at any stage, but usually after flowering, upper canopy on new leaves
2. First appears on upper leaf surfaces as small, dark, water-soaked spots
3. Small dark spots enlarge to 1/4 inch, centers change from gray to brown to light tan and surrounded by a narrow reddish purple margin
4. Lesions may coalesce, irregular areas
5. Stems and pods can be infected later in the season

N EXTENSION

Progression of Frogeye Leaf Spot



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Frogeye Look-alikes

Phyllosticta

Target Spot

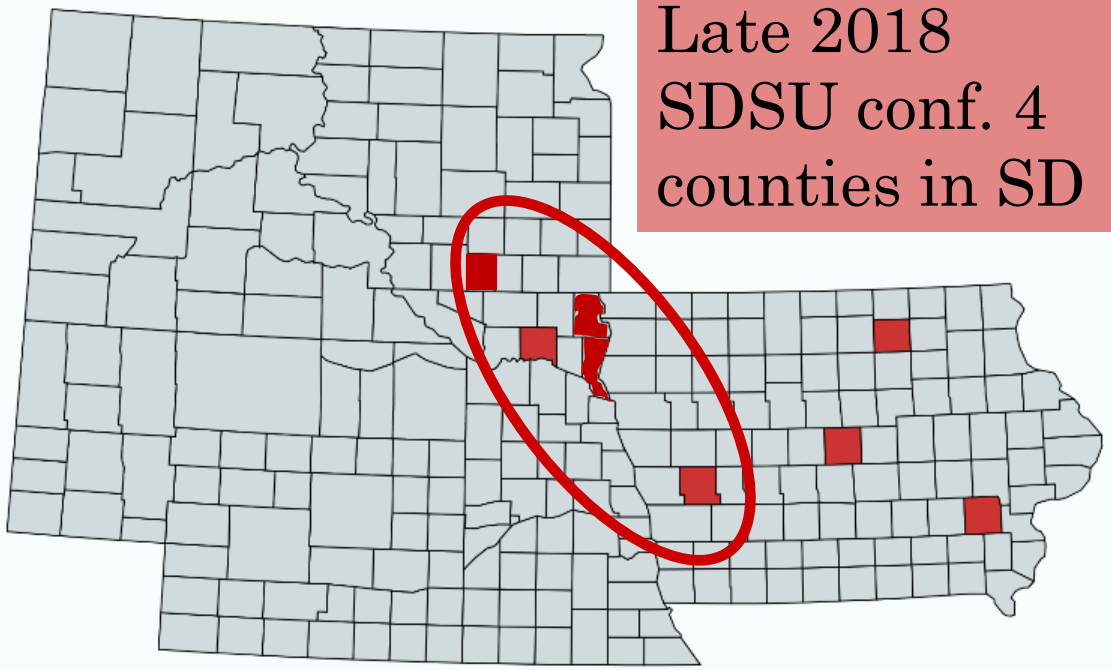
Alternaria

Bottom Line:
Lab testing is key to proper identification

Fungicide Resistance –
Weed Guide page 255

EXTENSION

U.S. Counties and Year QoI (Group 11 or Strobilurin) Fungicide Resistance confirmed in *Cercospora sojina* causing Frogeye Leaf Spot



Late 2018
SDSU conf. 4 counties in SD

WATCH OUT!
Resistance may already be here!

#IRPests

Widespread Occurrence of Quinone Outside Inhibitor Fungicide-Resistant Isolates of Cercospora sojina, Causal Agent of Frogeye Leaf Spot of Soybean, in the United States. G. Zhang, et al. 2018. Plant Health Progress 19:295-302. https://doi.org/10.1094/PHP-04-18-0016-RS

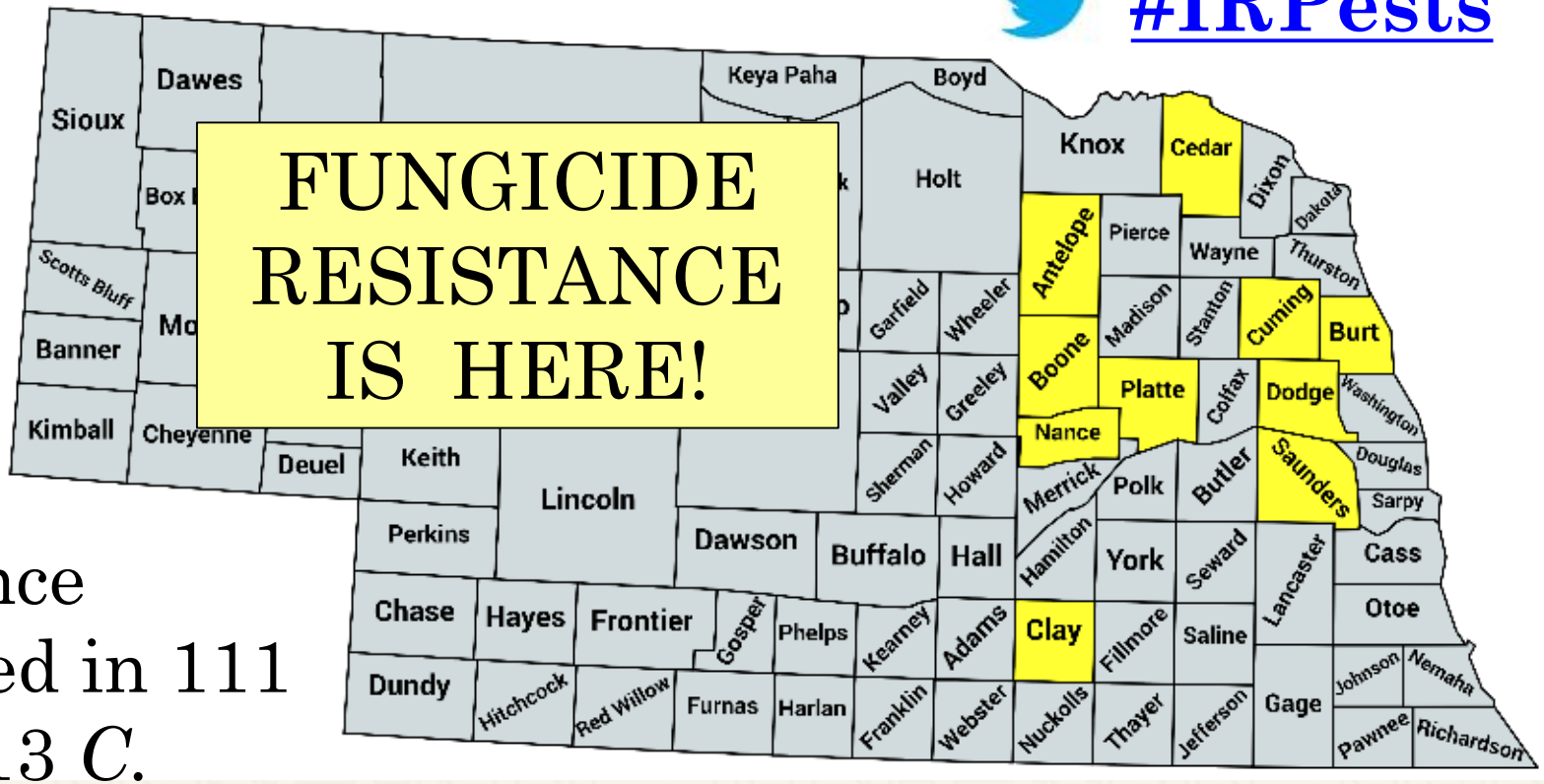
Frogeye Leaf Spot Management

- Soybean varieties vary in their susceptibility and resistant varieties are available. Check with your seed company rep
- Crop rotation and residue management
- Scout for disease, especially following warm, moist conditions at or after flowering
- 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 and close to Nebraska
  - Consider a product with 2 or more modes of action
- ***NOTE – If you see reduced effects of fungicides – please contact us or collect/send samples for advanced testing

N EXTENSION

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

#IRPests



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

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

EXTENSION

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

- Never use fungicides with active ingredients from single 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 modes of action (3+7+11)

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
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	

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)	
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
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	

EXTENSION

Resources to Utilize

1. Soybean Disease Management Publication CPN-1017
2. UNL Weed Guide – Turn to page 272-273
3. Seed Company/Crop Adviser/Extension Educator
4. Websites
    1. cropwatch.unl.edu
    2. iwilltakeaction.com (examples)
    3. cropprotectionnetwork.org

CROP PROTECTION NETWORK
A Product of Land Grant Universities

SOYBEAN DISEASE MANAGEMENT
CPN-1017

Frogeye Leaf Spot

Frogeye leaf spot of soybean is caused by the fungus *Cercospora sojina*. The disease occurs across the United States and in Ontario, Canada. This publication describes the symptoms of frogeye leaf spot and conditions favorable for the disease. We also point out how frogeye leaf spot differs from several other soybean diseases and disorders and suggest management practices.

Symptoms and Signs

Frogeye leaf spot initially appears on upper leaf surfaces as small, dark, water-soaked spots (lesions) (Figure 1). Eventually, these lesions enlarge and become round to angular.

Figure 1. Frogeye leaf spot symptoms start as small dark lesions.

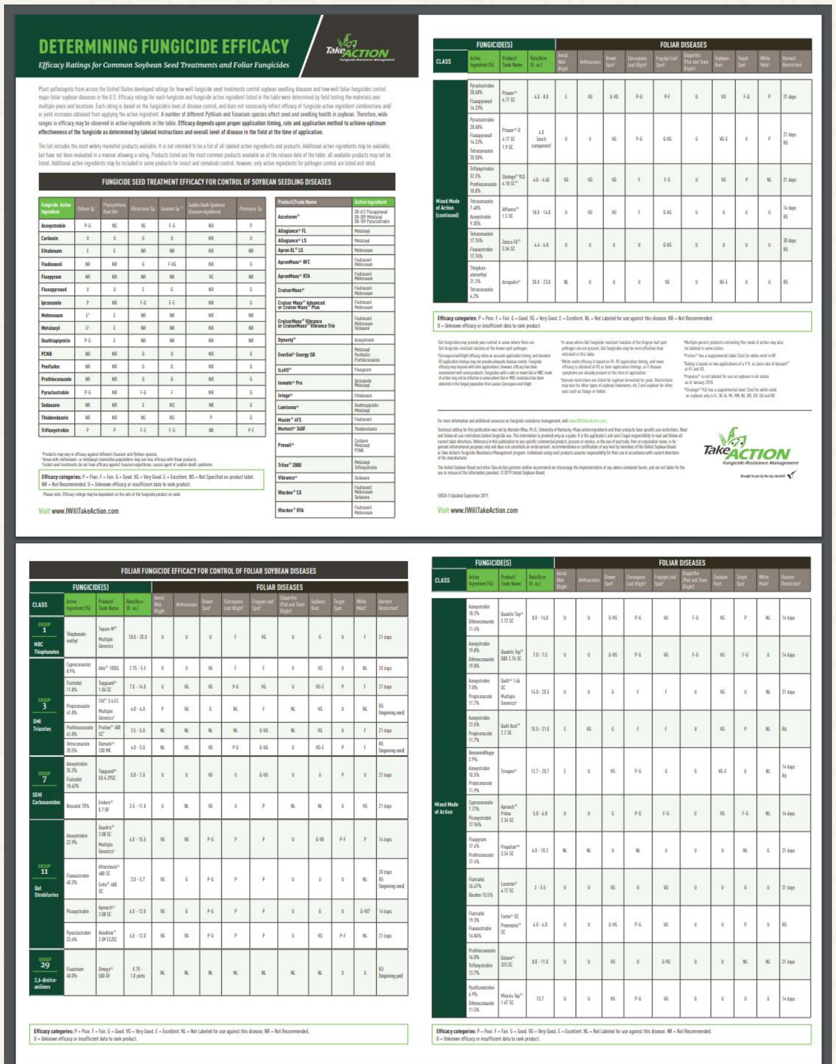
The centers of frogeye leaf spot lesions progress from gray to brown to light tan, and are surrounded by a narrow reddish purple margin (Figure 2). On some soybean varieties, you may also see a light green halo around the lesion border (Figure 3).

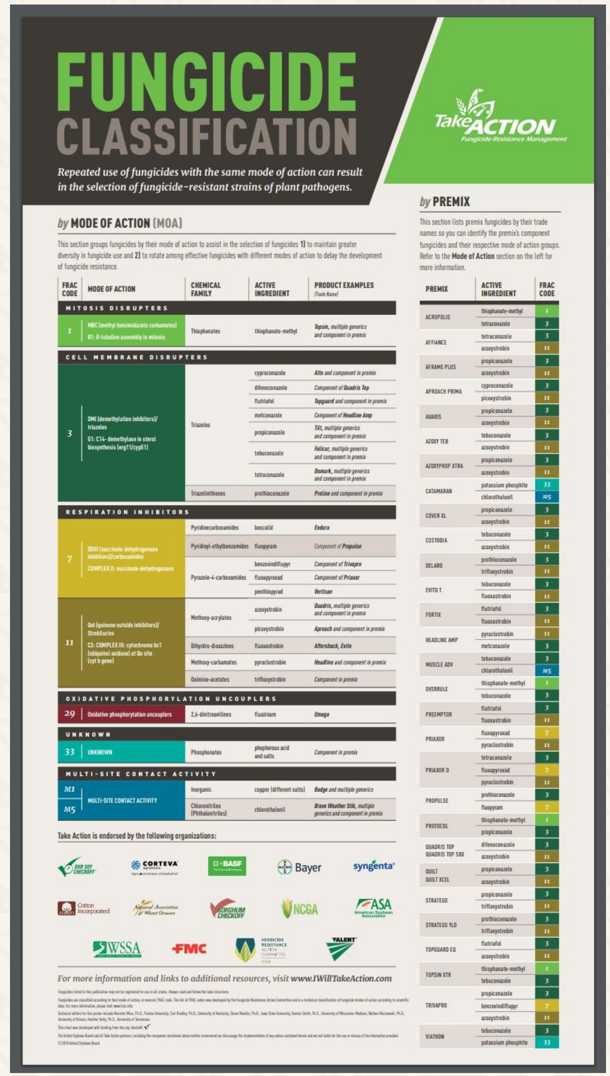
Figure 2. Reddish purple margins surround the gray centers on mature frogeye leaf spot lesions. The missing areas on this leaf are from insect feeding.

1

N EXTENSION

United Soybean Board (Checkoff)
iwilltakeaction.com





EXTENSION

Developing a 2020 Farm Plan

- Know who or where to get more information (use resources mentioned… print, bookmark, etc.)
- Get frogeye leaf spot resistance ratings for varieties
  - Work with seed dealers
  - Rank susceptibility of the varieties you are considering or already ordered
- Rank fields for frogeye leaf spot risk (crop rotation, past pressure, past fungicide efficacy)
- Scout for disease, especially following warm, moist conditions at or after flowering
- Use of foliar fungicides with active ingredients from 2-3 modes of action if spraying is warranted
  - Use Guide For Weed, Disease, and Insect Management in Nebraska Fungicide Efficacy Table to help – page 272-273