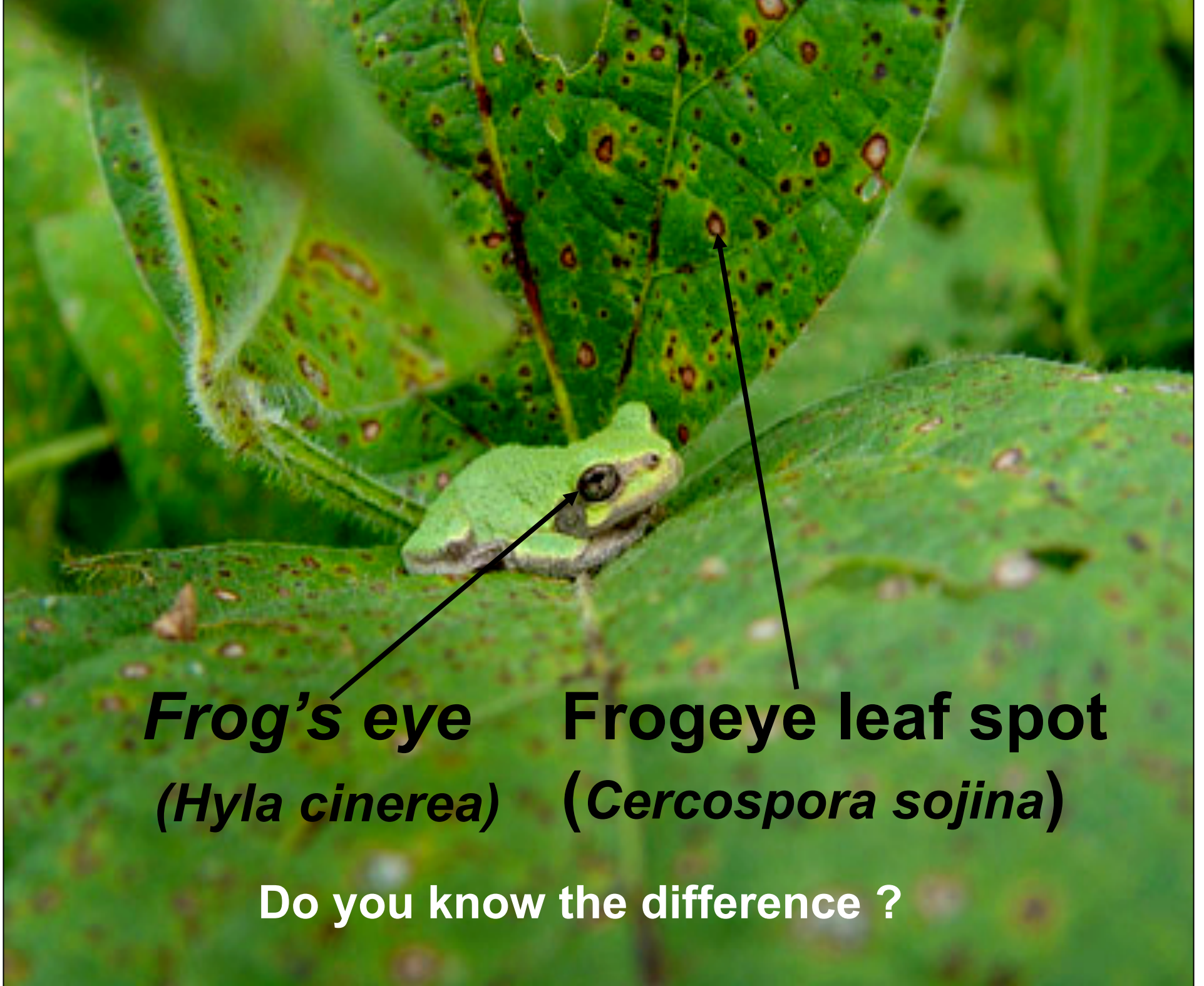




Frogeye Leaf Spot Control Cultivars and Fungicides

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Frog's eye
(Hyla cinerea)

Frogeye leaf spot
(Cercospora sojina)

Do you know the difference ?

Frogeye Leaf Spot Symptoms

- Caused by a fungus – *Cercospora sojina*
- Symptoms – small circular lesions with ashy white centers and purple margins
- Lesions coalesce to form larger ones.
- Leaves wither and fall prematurely.
- Stems, petioles, pods and seed are also infected.
- Seed coats may crack reducing seed quality.

History of Frogeye Leaf Spot ***Cercospora sojina***

- **First reported on soybean in 1915 in Japan.**
- **First reported on soybean in 1924 in US.**
- **FLS is now found everywhere soybeans are grown.**
- **Most destructive in warm humid regions.**
- **Yield reduction on susceptible cultivars can be up to 50 %.**

Disease Cycle of FLS

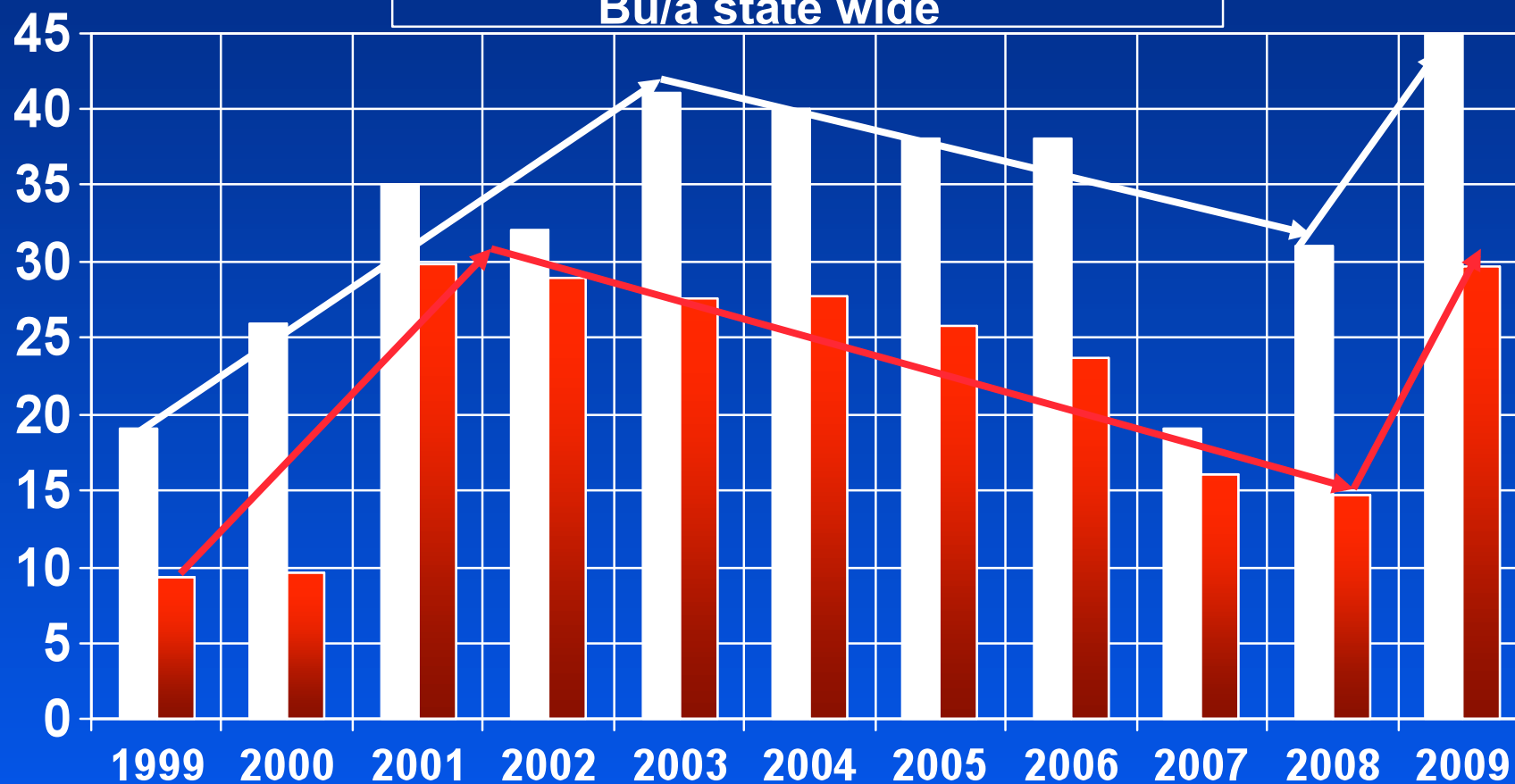
- *Cercospora sojina* survives as mycelium in infected seeds and soybean residue.
- Infected seed give rise to weak seedlings and infected cotyledon lesions provide inoculum for young leaves.
- During warm humid weather sporulation is profuse and conidia are carried by wind and rain to infect nearby plants all season.
- Younger leaves are infected more readily than older leaves. Fully expanded leaves do not develop many more lesions.
- Leaves, stems, petioles, and seeds can become infected
- Univ. of Georgia researchers have reported as many as 90 different races. Now reduced to 12, we have all.

Soybean Yields/Disease Loss

1999-2009, TN



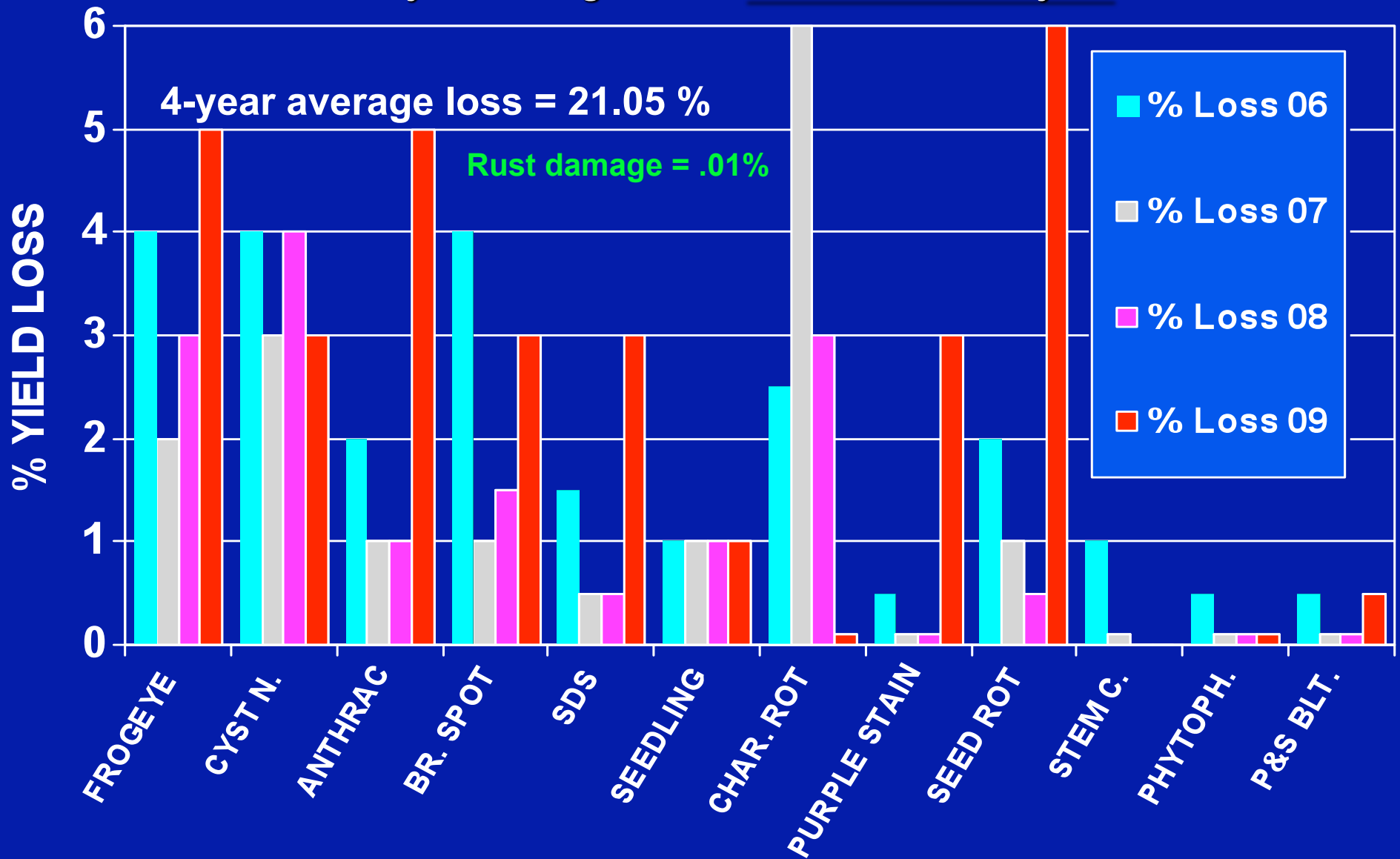
■ Aver. Yield ■ % disease loss
Bu/a state wide



Soybean Disease Loss Estimate for Tennessee, 2006 - 09

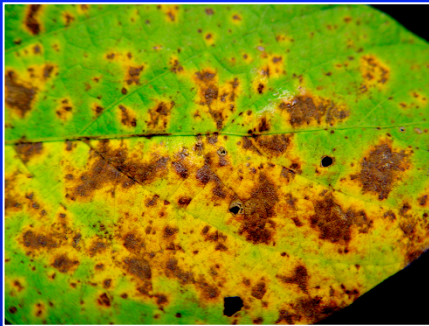
Total loss =, 23.7 % in 06, 16 % in 07, 14.8% in 08, 29.7% in 09

Four-year average loss = 8 million bushels/year



SSDW Foliar Disease Loss

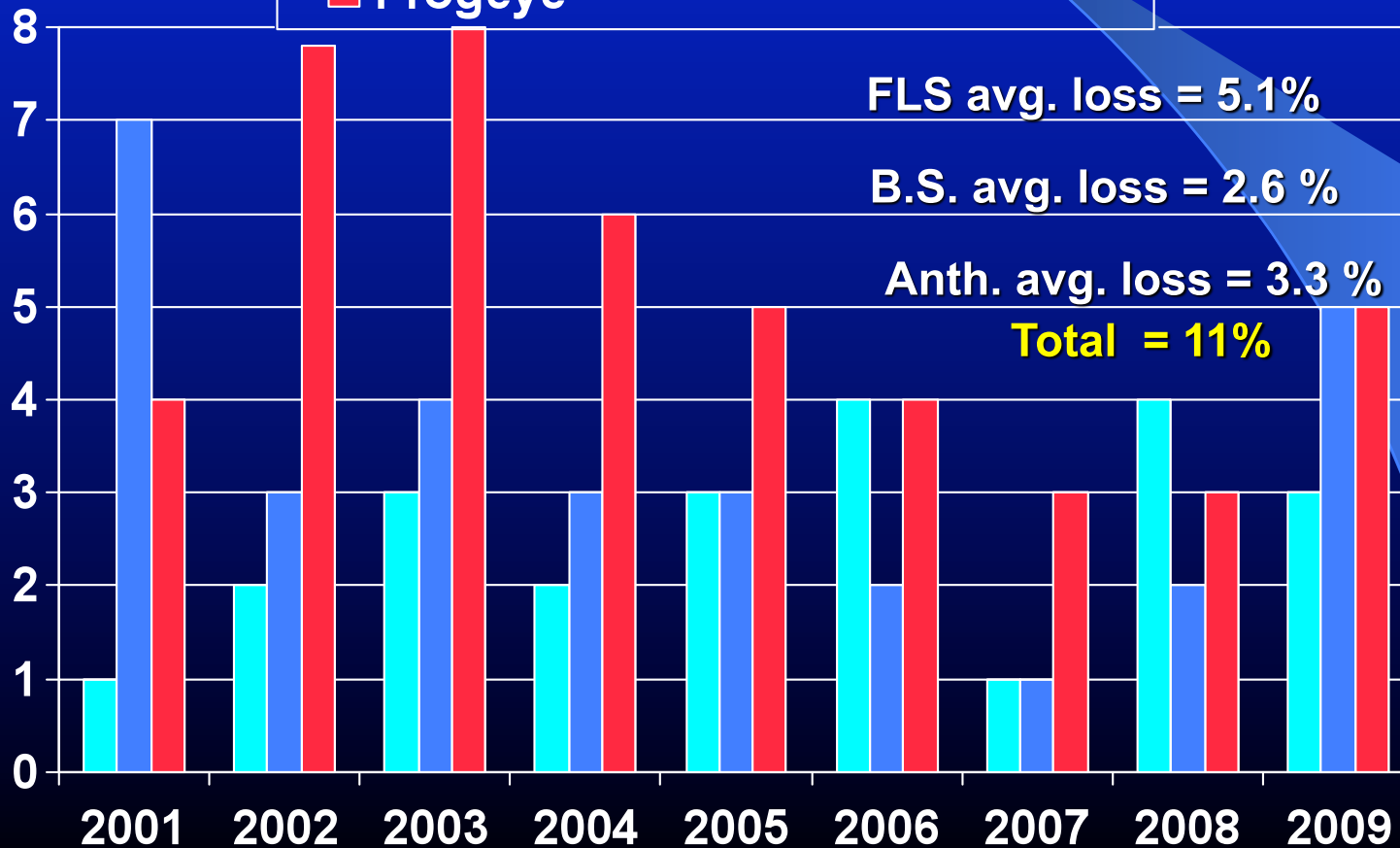
Estimate 2001-2009, TN

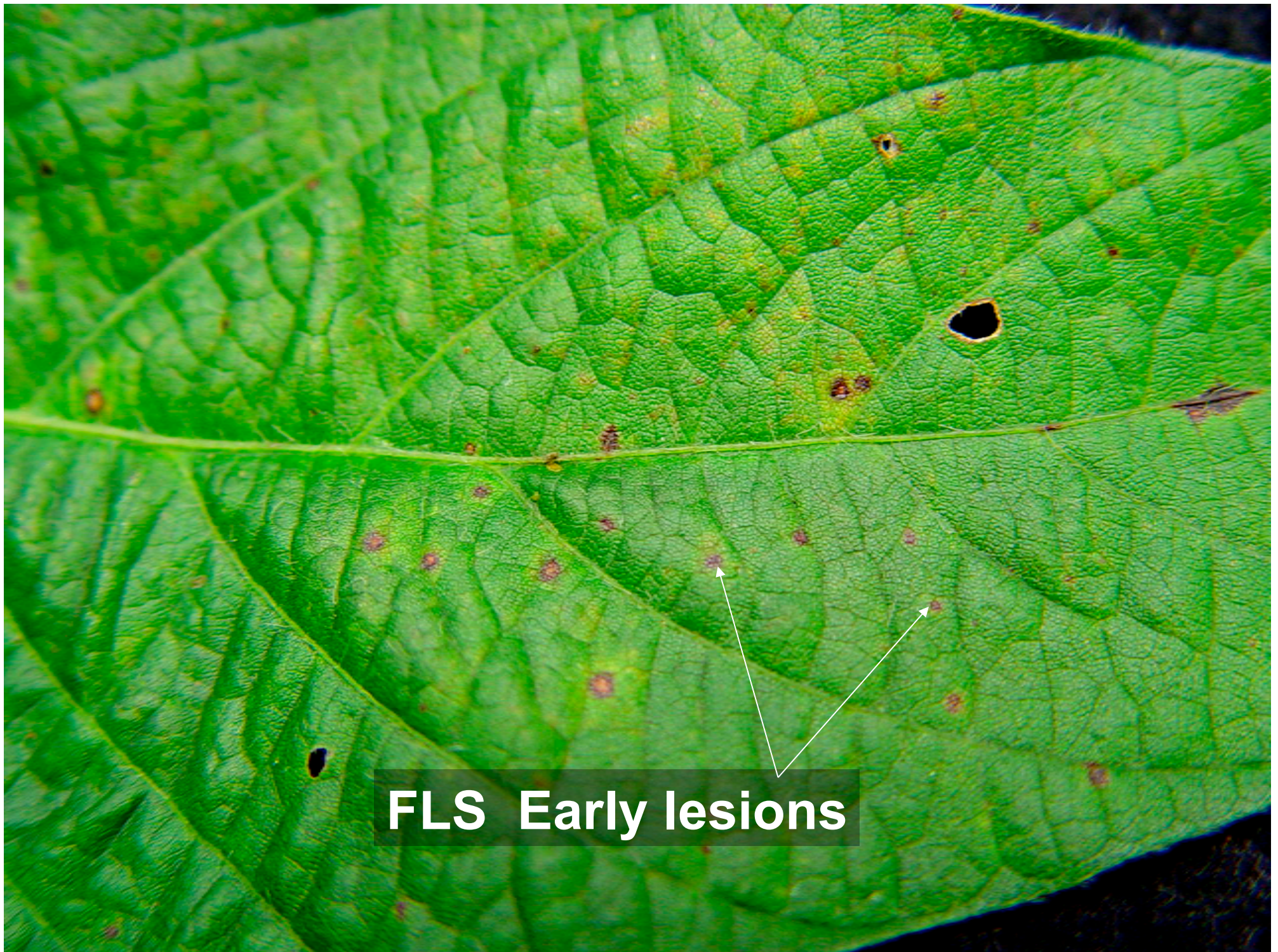


■ Brown spot

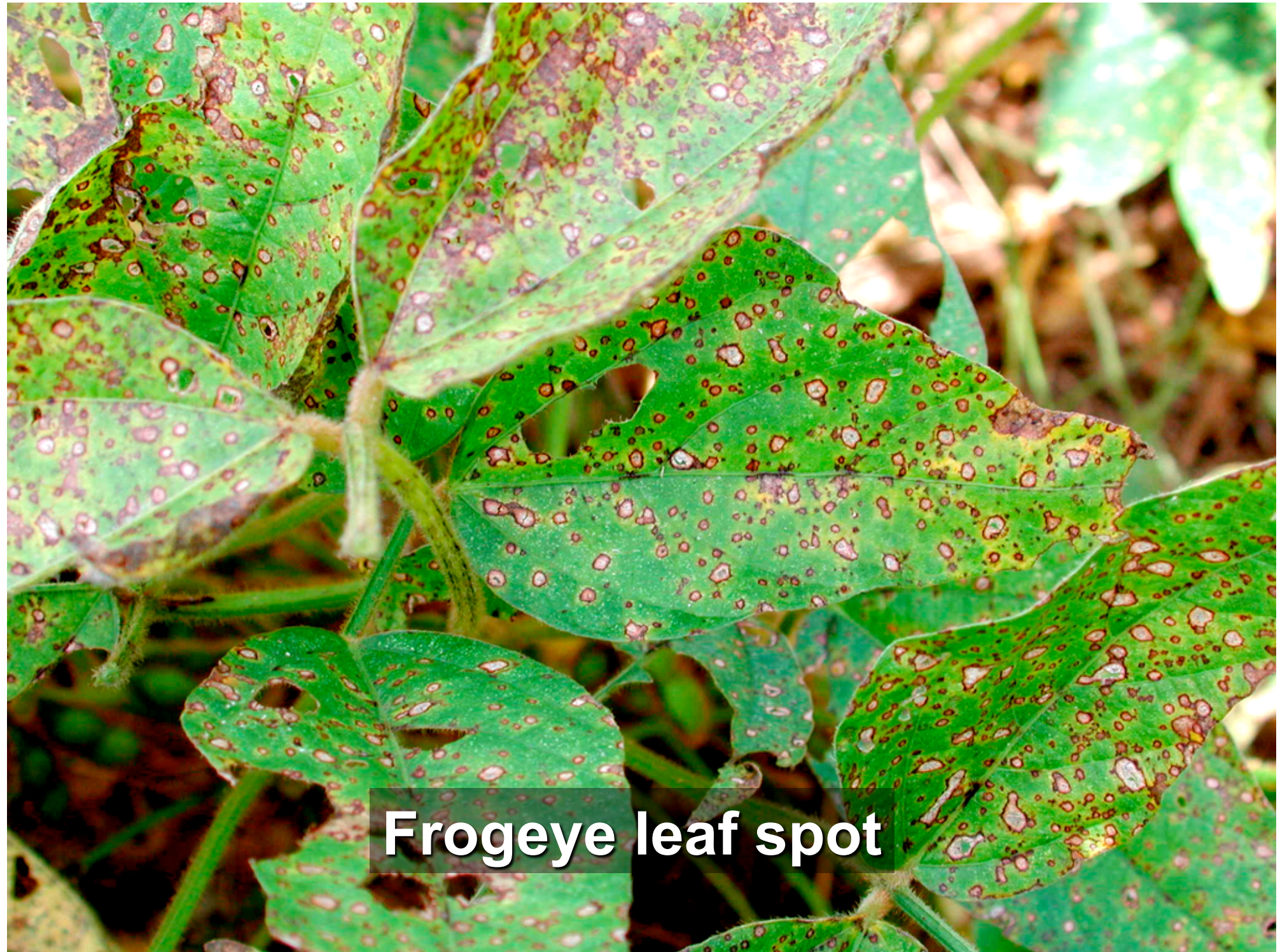
■ Anthracnose

■ Frogeye





FLS Early lesions



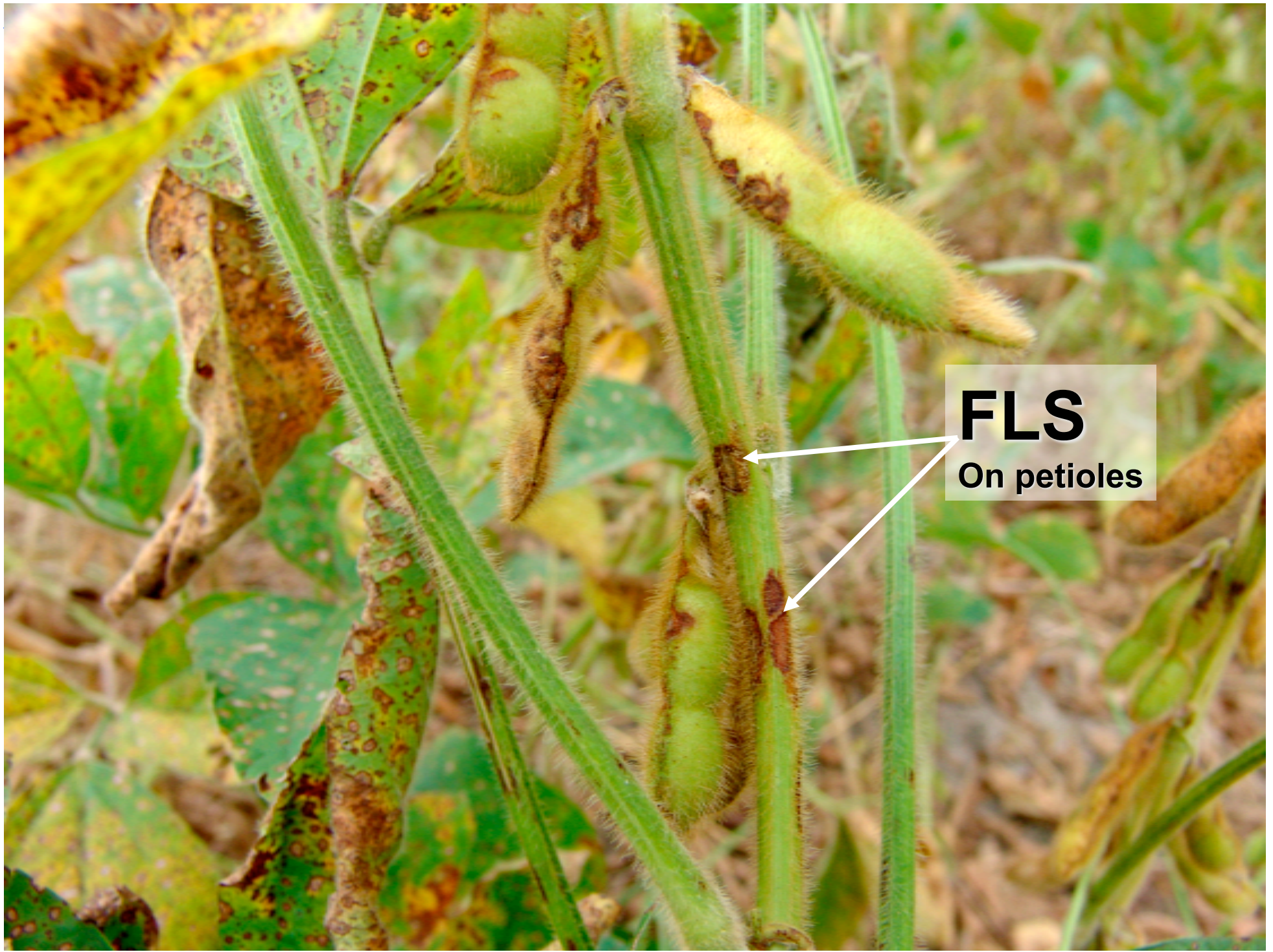
Frog-eye leaf spot



Frog-eye leaf spot



Frogeye leaf spot



FLS
On petioles

FLS




FLS





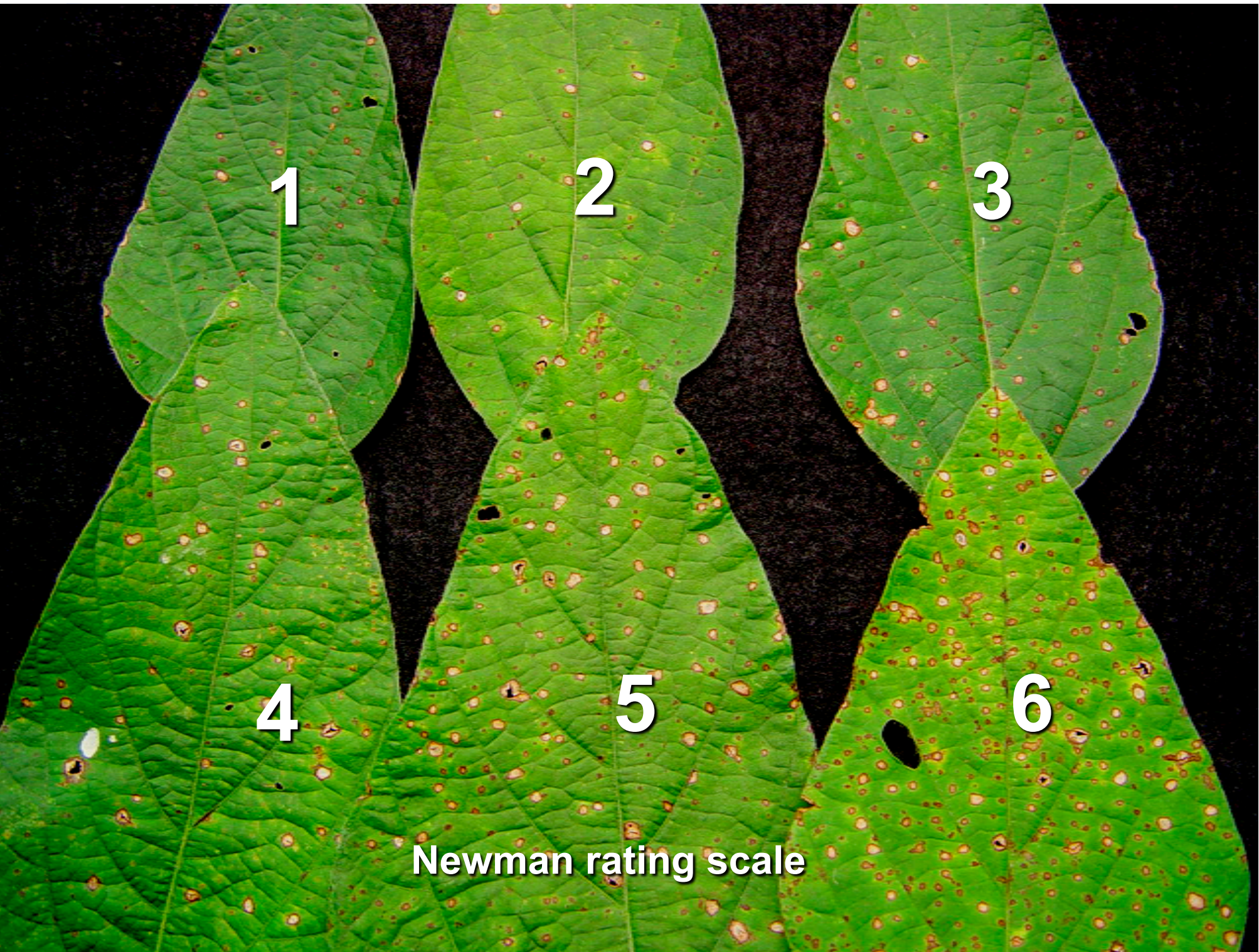
Frog-eye leaf spot

A photograph showing a plant with green leaves and stems, heavily affected by frog-eye leaf spot. The leaves are covered in numerous small, brown, necrotic spots. The ground is covered with a thick layer of dry, brown, fallen leaves and stems, indicating severe defoliation. A white text box is overlaid on the image, containing the text "Frogeye leaf spot" and "Severe defoliation".

Frogeye leaf spot
Severe defoliation

Poor Seed Quality





1

2

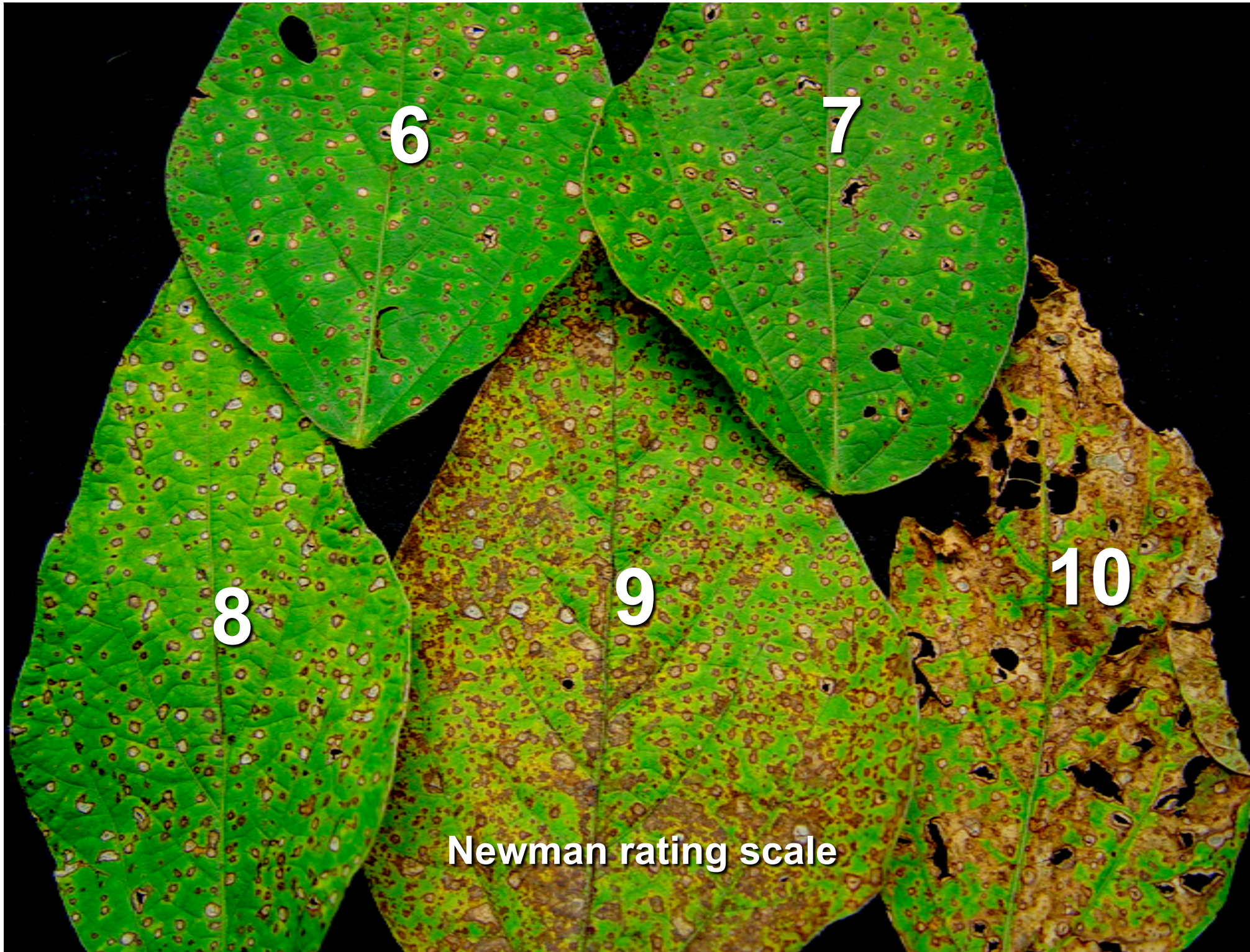
3

4

5

6

Newman rating scale



6

7

8

9

10

Newman rating scale



Disease Nursery Plots at RECM



Objective

- To determine the relative susceptibility of commercially available soybean cultivars and their response to a fungicide application



Methods

- Planted: varieties in early May ea. year
- Plot: RCB 3X, 4 rows 26'X 36" wide, ea. plot split into 2 rows treated and two rows untreated. Fungicides applied at R3 in 20 gal. water per acre with H.C. nozzles.
- Equipment: Spider Spray Trac with multi-boom.
- Rating Scale: 0 = no leaf spots, 10 = 100% leaf spots and starting to defoliate.
- All natural infection

FLS Test (# of varieties) and Aver. Yield

MREC Milan, TN, 2007, M.A.Newman

	MGIII 12 Var.		MG IV E 21 Var.		MG IV L 36 Var.		MG V E 18 Var.	
FLS Rating	No Spray	Sprayed Headline 6 oz/a	No Spray	Sprayed Headline 6 oz/a	No Spray	Sprayed Headline 6 oz/a	No Spray	Sprayed Headline 6 oz/a
None (0)	0	0	7	8	12	13	6	9
Low (1-3)	5	12	6	13	6	23	5	9
Mod. (4-6)	7	0	7	0	12	0	3	0
Severe (7-10)	0	0	1	0	6	0	4	0
Aver. Rating	3.9	1.2	3.1	0.8	3.2	0.9	2.9	0.6
Aver. Bu/a Inc.	51.5	69.1 +17.5	51.9	59.4 +7.5	46.8	53.7 +6.9	45.6	53.5 +7.9

FLS (# of varieties in each category) & Yields
MREC Milan, TN, 2008, M.A.Newman

FLS Rating	MGIII 5 Var.		MG IV E 15 Var.		MG IV L 30 Var.		MG V E 21 Var.	
	No Spray	Sprayed Headline 6 oz/a	No Spray	Sprayed Headline 6 oz/a	No Spray	Sprayed Headline 6 oz/a	No Spray	Sprayed Headline 6 oz/a
None (0)	0	0	2	4	8	11	9	13
Low (1-3)	2	5	6	11	6	19	5	8
Mod. (4-6)	3	0	7	0	10	0	3	0
Severe (7-10)	0	0	1	0	6	0	2	0
Aver. Rating	3.4	1.7	3.2	1.0	3.6	0.8	2.3	0.3
Aver. Bu/a Inc.	47.2	50.4 +3.9	52.1	58.5 +6.4	58.5	61.1 +2.6	40.1	43.3 +3.2

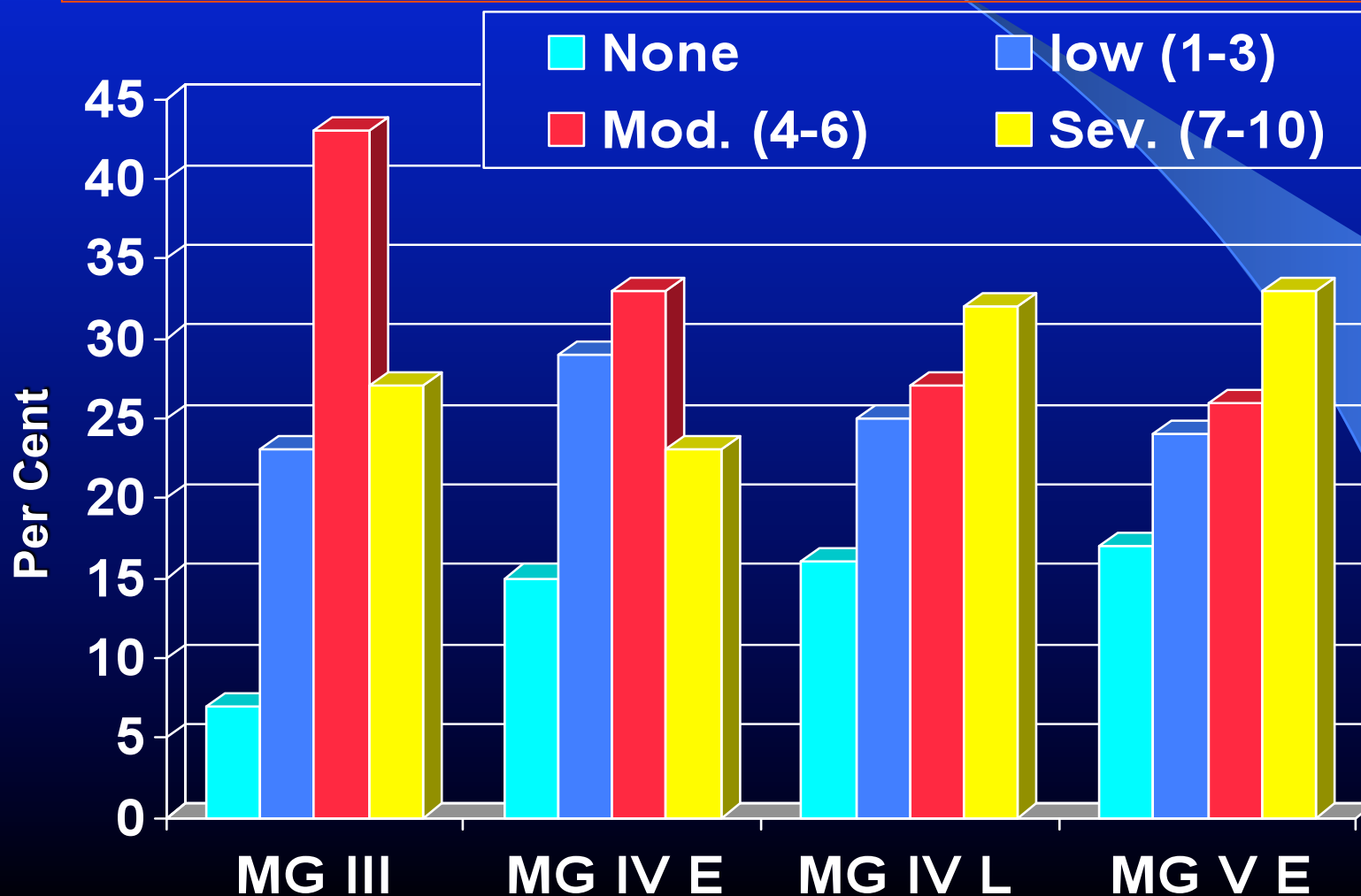
FLS (# of varieties in each category) & Yields

MREC Milan, TN, 2009, M.A.Newman

FLS Rating	MGIII 9 Var.		MG IV E 24 Var.		MG IV L 30 Var.		MG V E 21 Var.	
	No Spray	Sprayed Headline 6 oz/a	No Spray	Sprayed Headline 6 oz/a	No Spray	Sprayed Headline 6 oz/a	No Spray	Sprayed Headline 6 oz/a
None (0)	1	3	10	16	9	10	8	12
Low (1-3)	8	6	11	8	10	20	8	9
Mod. (4-6)	0	0	3	0	10	0	4	0
Severe (7-10)	0	0	0	0	1	0	1	0
Aver. Rating	1.33	0.48	1.04	0.26	2.33	0.76	1.76	0.48
Aver. Bu/a Inc.	36.11	46.36 +10.25	55.0	59.41 +4.41	57.36	62.15 +4.79	57.26	64.43 +7.17

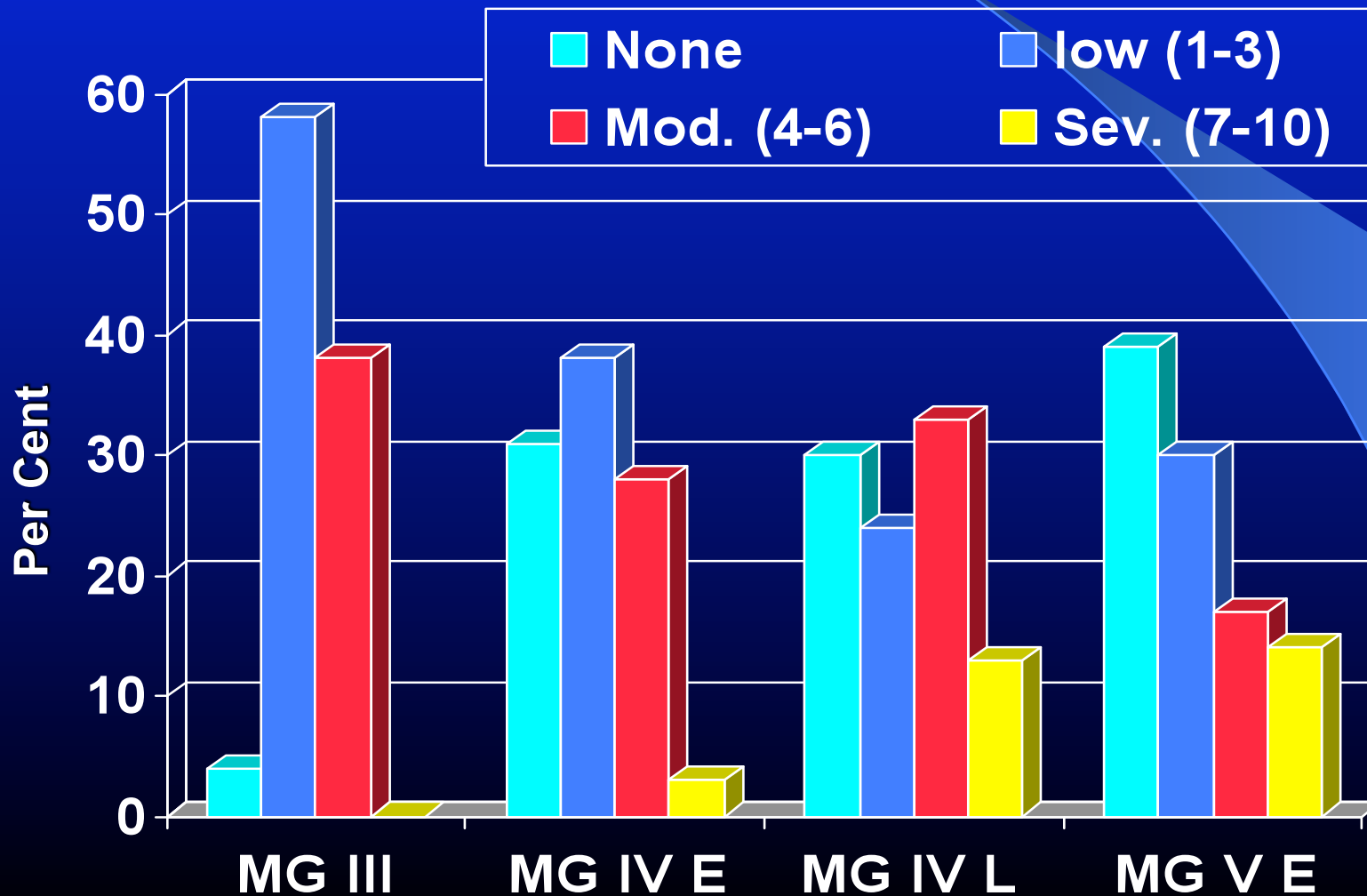
Frogeye leaf spot ratings

Rating categories for three year average (2004-06)
for each maturity group tested (597 varieties)



Frogeye leaf spot ratings

Rating categories for three year average (2007-09)
for each maturity group tested (242 varieties)



Varieties with "O" Frogeye Leaf Spot in 2007-09

M.A. Newman, RECM (* = 2 years, ** = 3 years)

MG V E (15)	MG IV L (15)	MG IV E (17)	MG III (2)
Dyna Gro 33B52*	North. K 46-U6	Steyer 4030	P. 95Y41A (.7)
Dyan Gro 33X55*	Pioneer 94Y70*	Armor 42-M1*	P. 93Y92
Ag.So. Gen. 568**	Pioneer 94B73	AgVenture 44G5	
Dairyland 8512**	Stine 4782-4 **	Pioneer 94M50	
FFR 5663	Trisoy 4760 *	DP 4112	
Armor 53-25	USG 74T98	MorSoy RT4007	
Armor 55-A5	Vigoro 49N6	Schillinger 457*	
Armor 52K6	AgVenture 47G7	TN 04-4715	
Armor 52-U2	Delta King 4968	Vigoro 42N3	
Stine 5482-4	Armor 47-F8 **	Stine 4392	
MorSoy RT5388N	Croplan 4877*	Steyer 4430	
NK S52-F2	Dyna-Gro 32R46*	Caleb So. Cross	
Dairyland 8509	Dyna-Gro V49N6	Asgrow 4303	
Asg. DP5335	Schillinger 495RC	Steyer 4210	
Progeny 5218	Galilee So.Cross	Dyna-Gro V42N9	
		USG 74B58	
		Croplan 4417	



Objective

- To determine efficacy of 5 fungicides to control Frogeye Leaf Spot sprayed at R3 and R3 & R5 over a four-year period.



Methods

- Planted: Asgrow 4603 (only in 2005) and 4703 first week of May each year (2005-08). No-till, over-head irrigated and non-rotated, silt loam soil.
- Plot: RCB 4X, 4 rows 30' X 36" wide, rated and harvested center two rows. Fungicides applied in 20 gal. water per acre with H.C. nozzles.
- Equipment: Spider Spray Trac with multi-boom.
- Rating Scale: 0 = no leaf spots, 10 = 100% leaf spots and starting to defoliate.

Soybean Foliar Fungicide Test – 2005

MREC, TN, M.A. Newman

Fungicide Treatment	Rate/A fl oz/a	App. Stage	Yield Bu/A	Bu/a Inc.	Inc. R3,R5	FLS 0-10	% Defol
Unt. Check	---	---	25.8 c	---	---	8.3	100
Quadris	6.2	R3	40.5 ab	14.7	---	2.0	63.8
Quadris	6.2	R3 & R5	44.1 ab	18.3	3.6	1.0	55.0
Headline	6.0	R3	41.0 ab	15.2	---	2.8	56.3
Headline	6.0	R3 & R5	46.4 a	20.6	5.4	1.3	23.8
Headline SBR	7.8	R3	38.9 ab	13.1	---	3.3	38.9
Headline SBR	7.8	R3 & R5	41.7 ab	15.9	2.8	1.0	23.8
Quilt	20	R3	42.0 ab	16.2	---	2.5	73.8
Quilt	20	R3 & R5	43.0 ab	17.0	0.8	1.8	31.3
Stratego	10	R3	37.5 b	11.7	---	3.3	73.8
Stratego	10	R3 & R5	40.7 ab	14.9	3.2	1.5	55.0
LSD (P=.05)	---	---	5.25	---	---	0.66	23.74

Soybean Foliar Fungicide Test – 2005

MREC, TN, M.A. Newman

Fungicide Treatment	Rate/A fl oz/a	App. Stage	Yield Bu/A	Bu/a Inc.	Inc. R3,R5	FLS 0-10
Unt. Check	---	---	25.8 c	---	---	8.3
Quadris	6.2	R3	40.5 ab	14.7	---	2.0
Quadris	6.2	R3 & R5	44.1 ab	18.3	3.6	1.0
Headline	6.0	R3	41.0 ab	15.2	---	2.8
Headline	6.0	R3 & R5	46.4 a	20.6	5.4	1.3
Headline SBR	7.8	R3	38.9 ab	13.1	---	3.3
Headline SBR	7.8	R3 & R5	41.7 ab	15.9	2.8	1.0
Quilt	20	R3	42.0 ab	16.2	---	2.5
Quilt	20	R3 & R5	43.0 ab	17.0	0.8	1.8
Stratego	10	R3	37.5 b	11.7	---	3.3
Stratego	10	R3 & R5	40.7 ab	14.9	3.2	1.5
LSD (P=.05)	---	---	5.25	---	---	0.66

Soybean Foliar Fungicide Test – 2006

MREC, TN, M.A. Newman

Fungicide Treatment	Rate/A fl oz/a	App. Stage	Yield Bu/A	Bu/a Inc.	Inc. R3,R5	FLS 0-10	% Defol
Unt. Check	---	---	58.5 a	---	---	6.50	77.3
Quadris	6.2	R3	62.8 a	4.3	---	2.25	33.8
Quadris	6.2	R3 & R5	66.9 a	8.4	4.1	0.63	25.0
Headline	6.0	R3	61.8 a	3.3	---	0.23	15.5
Headline	6.0	R3 & R5	69.5 a	11.0	7.7	0.00	6.8
Headline SBR	7.8	R3	61.9 a	3.4	---	0.50	12.8
Headline SBR	7.8	R3 & R5	64.5 a	6.0	2.6	0.50	9.0
Quilt	20	R3	56.4 a	-2.1	---	1.13	46.3
Quilt	20	R3 & R5	59.0 a	0.5	-1.6	0.63	35.0
Stratego	10	R3	66.0 a	7.5	---	0.68	36.3
Stratego	10	R3 & R5	58.5 a	0.0	-7.5	0.10	11.8
LSD (P=.05)	---	---	13.08	---	---	1.053	32.57

Soybean Foliar Fungicide Test – 2006

MREC, TN, M.A. Newman

Fungicide Treatment	Rate/A fl oz/a	App. Stage	Yield Bu/A	Bu/a Inc.	Inc. R3,R5	FLS 0-10
Unt. Check	---	---	58.5 a	---	---	6.50
Quadris	6.2	R3	62.8 a	4.3	---	2.25
Quadris	6.2	R3 & R5	66.9 a	8.4	4.1	0.63
Headline	6.0	R3	61.8 a	3.3	---	0.23
Headline	6.0	R3 & R5	69.5 a	11.0	7.7	0.00
Headline SBR	7.8	R3	61.9 a	3.4	---	0.50
Headline SBR	7.8	R3 & R5	64.5 a	6.0	2.6	0.50
Quilt	20	R3	56.4 a	-2.1	---	1.13
Quilt	20	R3 & R5	59.0 a	0.5	-1.6	0.63
Stratego	10	R3	66.0 a	7.5	---	0.68
Stratego	10	R3 & R5	58.5 a	0.0	-7.5	0.10
LSD (P=.05)	---	---	13.08	---	---	1.053

Soybean Foliar Fungicide Test – 2007

MREC, TN, M.A. Newman

Fungicide Treatment	Rate/A fl oz/a	App. Stage	Yield Bu/A	Bu/a Inc.	Inc. R3,R5	FLS 0-10
Unt. Check	---	---	36.5 b	---	---	8.3
Quadris	6.2	R3	41.8 a	5.3	---	4.3
Quadris	6.2	R3 & R5	46.5 a	10.0	4.7	1.0
Headline	6.0	R3	45.4 a	8.9	---	2.8
Headline	6.0	R3 & R5	49.1 a	12.6	3.7	1.0
Headline SBR	7.8	R3	46.1 a	9.6	---	3.0
Headline SBR	7.8	R3 & R5	47.9 a	11.4	1.8	1.0
Quilt	20	R3	43.6 a	7.1	---	3.0
Quilt	20	R3 & R5	47.2 a	10.7	3.6	1.3
Stratego	10	R3	46.8 a	10.3	---	2.8
Stratego	10	R3 & R5	49.8 a	13.3	3.0	1.3
LSD (P=.05)	---	---	4.80	---	---	1.17

Soybean Foliar Fungicide Test – 2007

MREC, TN, M.A. Newman

Fungicide Treatment	Rate/A fl oz/a	App. Stage	Yield Bu/A	Bu/a Inc.	Inc. R3,R5	FLS 0-10	Anthr. 0-10
Unt. Check	---	---	36.5 b	---	---	8.3	6.3
Quadris	6.2	R3	41.8 a	5.3	---	4.3	3.8
Quadris	6.2	R3 & R5	46.5 a	10.0	4.7	1.0	2.0
Headline	6.0	R3	45.4 a	8.9	---	2.8	3.0
Headline	6.0	R3 & R5	49.1 a	12.6	3.7	1.0	1.8
Headline SBR	7.8	R3	46.1 a	9.6	---	3.0	2.8
Headline SBR	7.8	R3 & R5	47.9 a	11.4	1.8	1.0	1.3
Quilt	20	R3	43.6 a	7.1	---	3.0	2.5
Quilt	20	R3 & R5	47.2 a	10.7	3.6	1.3	2.3
Stratego	10	R3	46.8 a	10.3	---	2.8	3.3
Stratego	10	R3 & R5	49.8 a	13.3	3.0	1.3	1.8
LSD (P=.05)	---	---	4.80	---	---	1.17	0.92

Soybean Foliar Fungicide Test – 2008

MREC, TN, M.A. Newman

Fungicide Treatment	Rate/A fl oz/a	App. Stage	Yield Bu/A	Bu/a Inc.	Inc. R3,R5	FLS 0-10
Unt. Check	---	---	53.0 b	---	---	7.5
Quadris	6.2	R3	58.2 a	5.2	---	2.5
Quadris	6.2	R3,R5	60.0 a	7.0	+1.8	1.0
Headline	6.0	R3	60.9 a	7.9	---	1.5
Headline	6.0	R3,R5	59.1a	6.1	-1.8	.03
Head. SBR	7.8	R3	57.1 ab	4.1	---	1.4
Head. SBR	7.8	R3,R5	61.1 a	8.1	+4.0	0.0
Quilt	20	R3	56.7 ab	3.7	---	3.0
Quilt	20	R3,R5	61.3 a	8.3	+4.6	0.5
Stratego	10	R3	59.4 a	6.4	---	1.3
Stratego	10	R3,R5	60.7 a	7.7	+1.3	1.8
LSD (P=.05)	---	---	4.84	---	---	0.99

Soybean Foliar Fungicide Test
Four-year average 2005 – 2008
MREC, TN, M.A. Newman

Fungicide Treatment	Rate/A fl oz/a	Application Stage	Yield Bu/A	Bu/a Inc. Over ck	Bu/a, inc. Over R3
Unt. Check	---	---	43.5	---	---
Quadris	6.2	R3	50.8	7.3	---
Quadris	6.2	R3 & R5	54.4	10.9	3.6
Headline	6.0	R3	52.3	8.8	---
Headline	6.0	R3 & R5	56.0	12.5	3.7
Headline SBR	7.8	R3	51.0	7.5	---
Headline SBR	7.8	R3 & R5	53.8	10.3	2.8
Quilt	20	R3	49.7	6.2	---
Quilt	20	R3 & R5	52.6	9.1	2.9
Stratego	10	R3	52.4	8.9	---
Stratego	10	R3 & R5	52.4	8.9	0.0
Average	---	R3	---	7.74	3.25

Summary

- **Three of the four years fungicides were significant better than the untreated with one treatment.**
- **A second treatment did not significantly increase yield, but several numerical increases were noted.**
- **Differences were fairly small among fungicides tested.**
- **There are now many cultivars that are resistant to FLS in TN.**
- **Data can be found at web site: www.utcrops.com**

Thank you !



Tennessee Soybean Promotion Board

Coverage
Coverage
Coverage

Thank you!
Questions ?





Spider trac sprayer