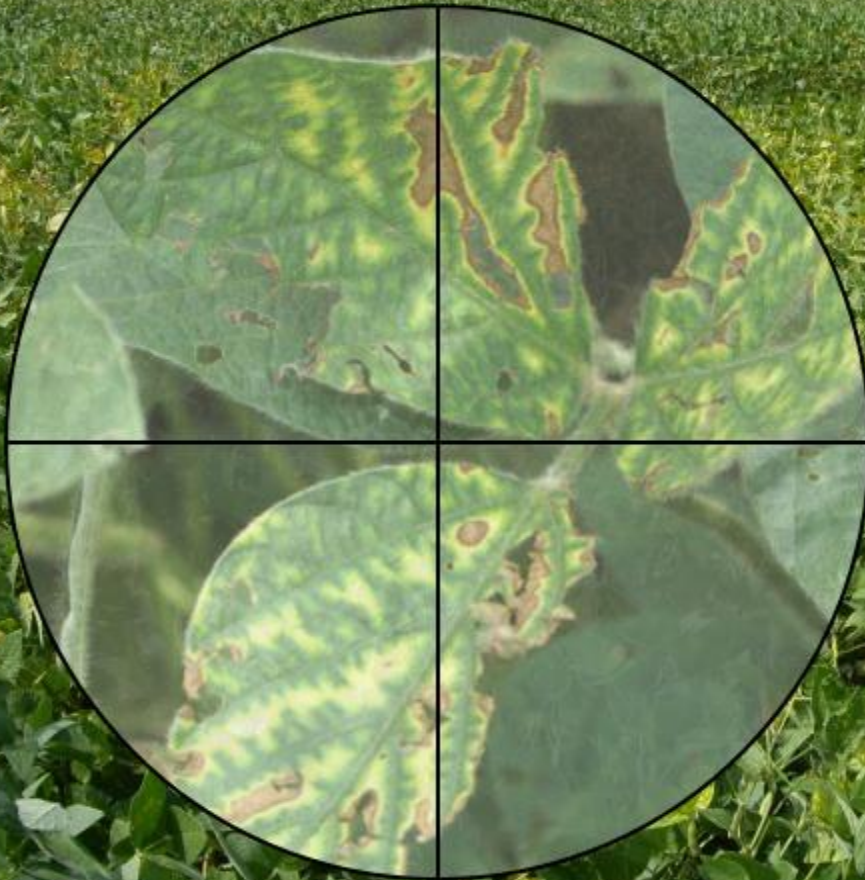


Integrated management of sudden death syndrome of soybean

Daren Mueller, ISU Extension Field Crop Pathologist



@dsmuelle

Symptoms



SDS Root Rot



D. Eastburn



Yield Loss

Disease incidence and severity combined =
Disease Index (DX)

At R6 (full seed), for every
10 unit increase in the
DX there is a 7%
reduction in yield.



Management

1. Resistance
- 2. Seed treatments**
3. Cultural practices



Plant Age at Time of Inoculation

Inoculation at different plant ages



Rating root and foliar severity

17°C / 7 days
24°C / 30 days

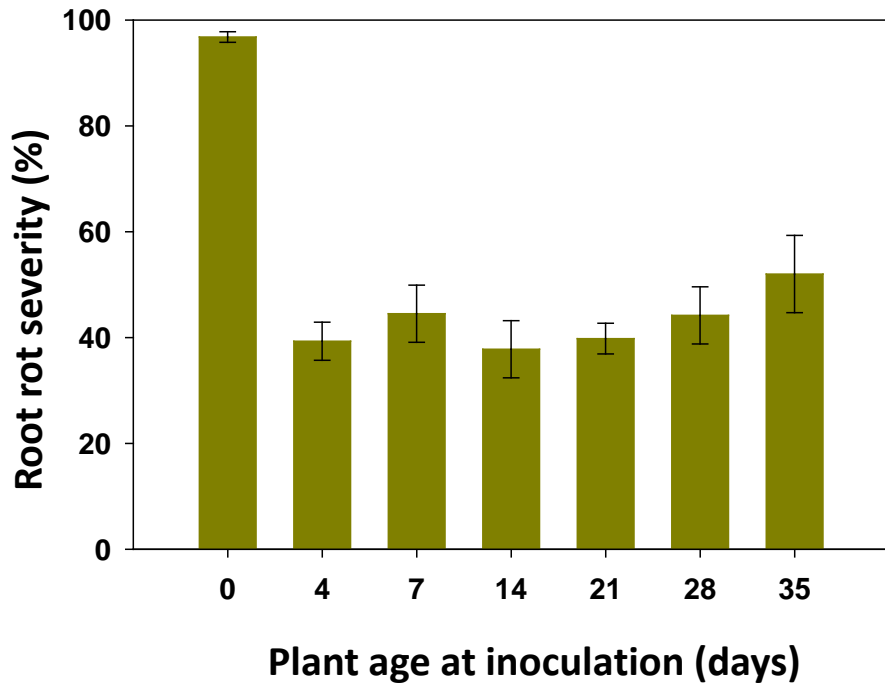


18 and 38 days
after inoculation

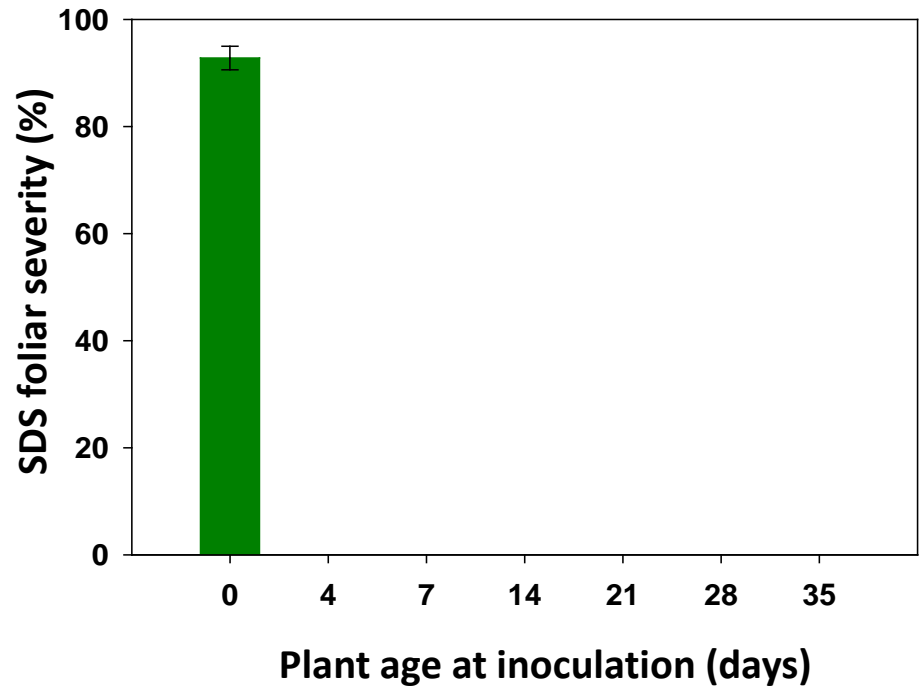


SDS Symptoms 38 Days After Inoculation

Roots



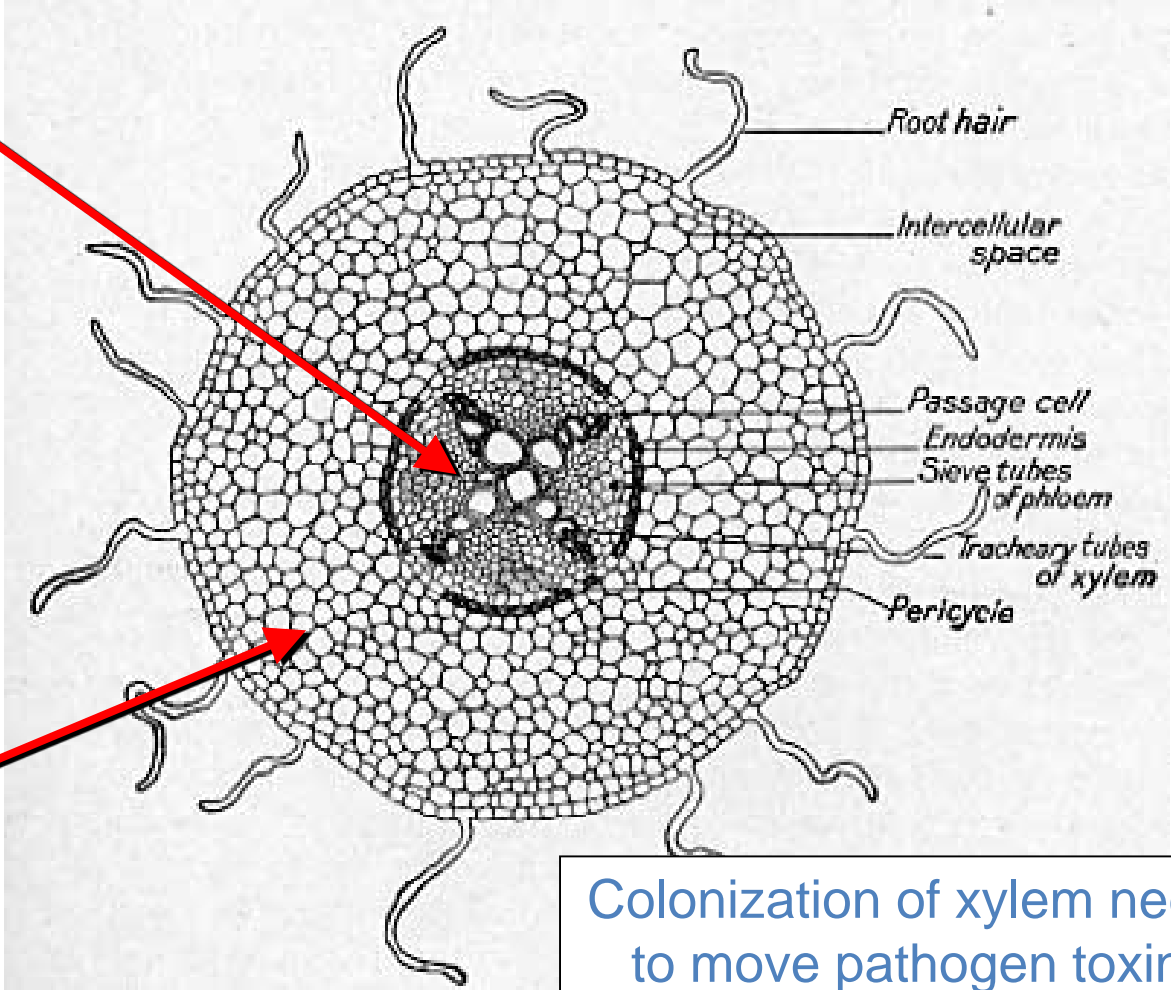
Leaves



Leaf Symptoms Occur When Xylem Colonized

Vascular tissue

Cortex

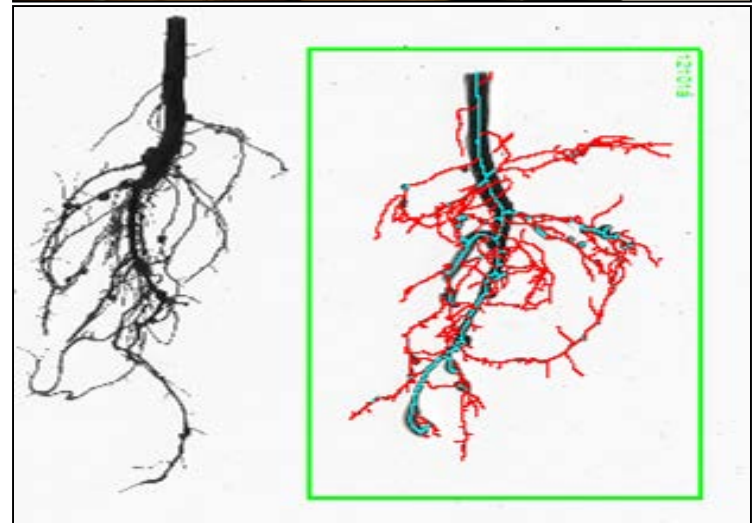
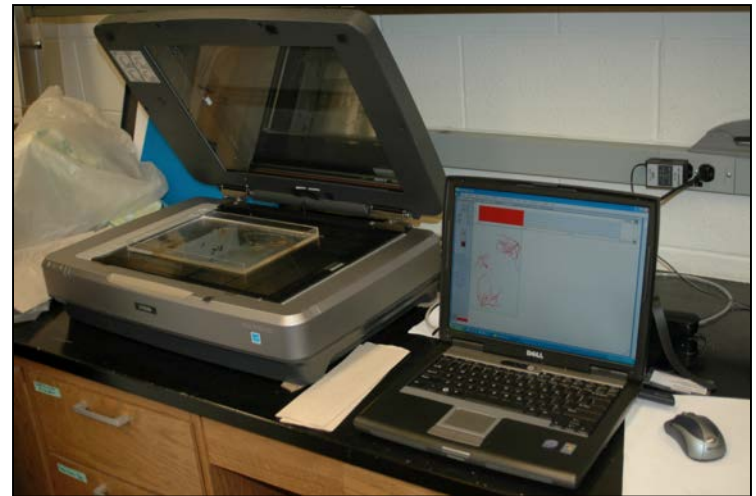


Colonization of xylem needed to move pathogen toxin to leaves



Seed treatments – Illinois

- Field trials and greenhouse trials
 - Multiple years, locations and varieties
 - 11 seed treatments + UTC
 - qPCR to detect *Fv*
 - Root scanning analyses
 - Plant stand
 - Root rot and SDS severity
 - Yield
- Commercially available products did not affect SDS



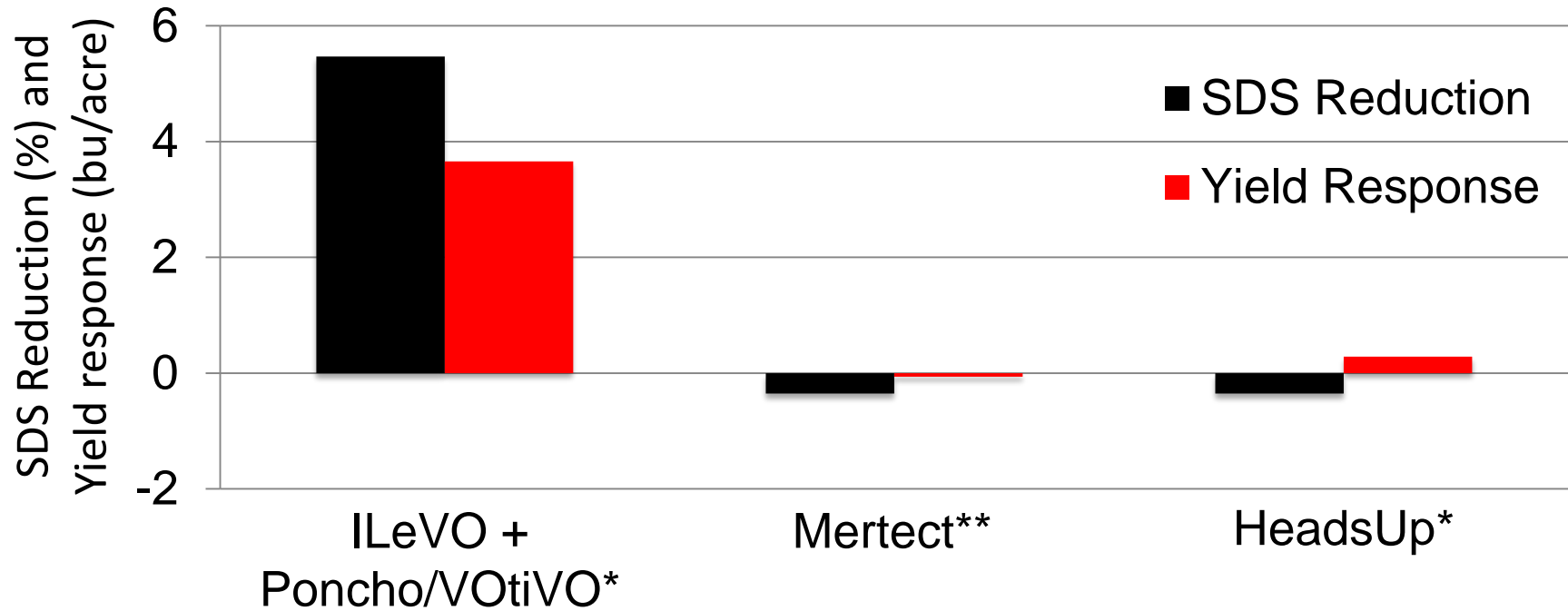
Evaluation of Seed Treatments

- 2013 – 2015
- ILeVO[®], Mertect[®], HeadsUp[®]
- Arkansas, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, Tennessee, Wisconsin, and Ontario, Canada



Product Comparison – 7 locations

Illinois, Indiana, Iowa (2), Michigan, Ontario (2)

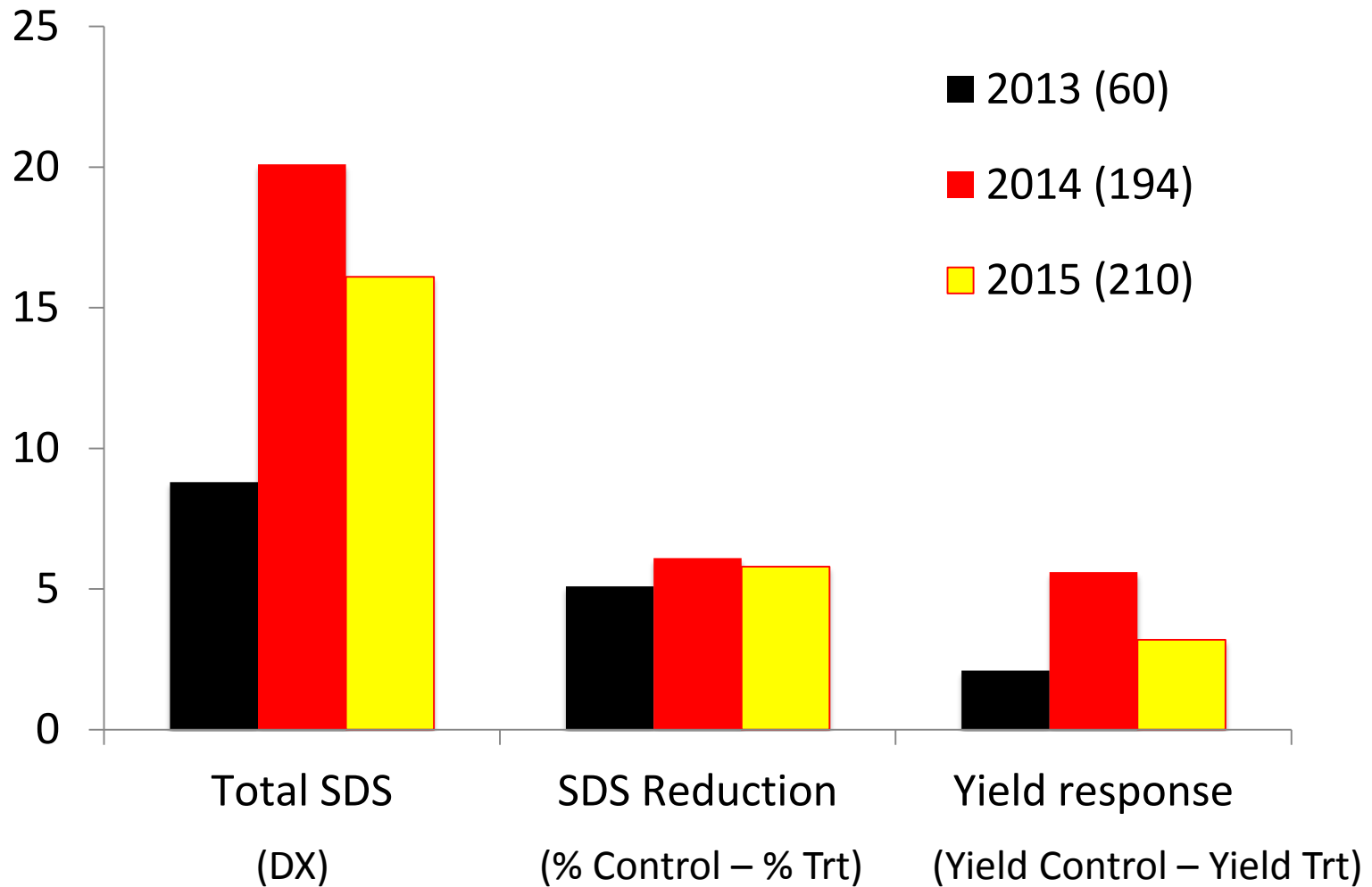


* Compared to Evergol Energy + Allegiance + Gaucho

** Compared to Cruiser Maxx Vibrance



ILeVO – All Comparisons



ILeVO – Resistance Levels

Resistance Levels	# obs	Total SDS	SDS Reduction	Yield response
Susceptible	136	18.9	7.0	4.2
Mod. resistant	246	14.5	5.8	3.2



ILeVO – Disease Levels

FDX Categories	# obs	Total SDS	SDS Reduction	Yield response
0	53	0.0	0.0	1.6
0.1 - 5	163	1.7	0.5	3.3
5.1 -10	43	7.7	3.2	3.7
10.1-20	67	14.8	7.9	5.4
>20	127	47.4	14.8	5.5



ILeVO Phytotoxicity on Soybean



Diseases/Disorders Cause Cotyledon Injury



Pythium seedling blight



Pre-emergence herbicide injury



Herbicide Interaction Study

- 2014 and 2015
- Indiana, Iowa
- Susceptible and resistant cultivars; each either treated with ILeVO or a base seed treatment
- Tested common pre-emerge herbicides
- Assessed phytotoxicity (V1 and V4) and stand at V4
- SDS index at R5-R6 and yield



Herbicide Interaction Study

- Visual damage early; grow out of it by V4
- Pre-emergence herbicides can increase phytotoxicity
- Cool, wet conditions make phytotoxicity worse
- No statistical interaction between ILeVO and pre-emergence herbicides
- No negative effect on yield



Seed treatment summary

- ILeVO seed treatment reduced SDS (when present)
- ILeVO yield response
 - Slightly higher on susceptible varieties
 - Best response when DX >10



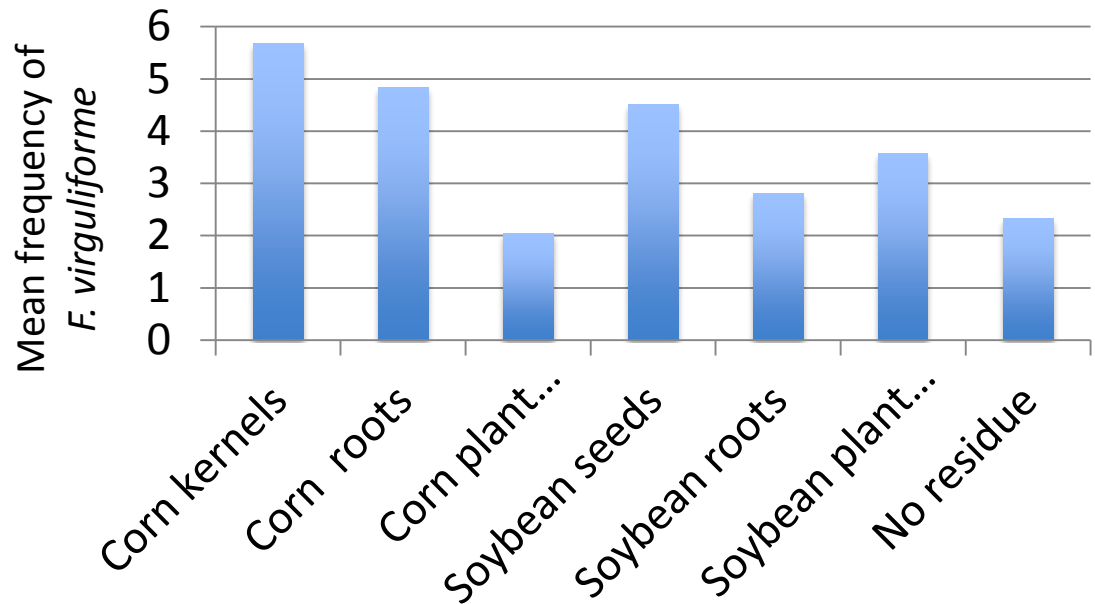
Management

1. Resistance
2. Seed treatments
- 3. Cultural practices**



Crop Rotation

- 96% of Iowa farmers indicated that they use crop rotation to manage SDS (Iowa Soybean Association, 2014)
- Corn can help *Fv* maintain or even increase in soil



Long Term Crop Rotation

ISU Marsden Farm, Boone Co., Iowa

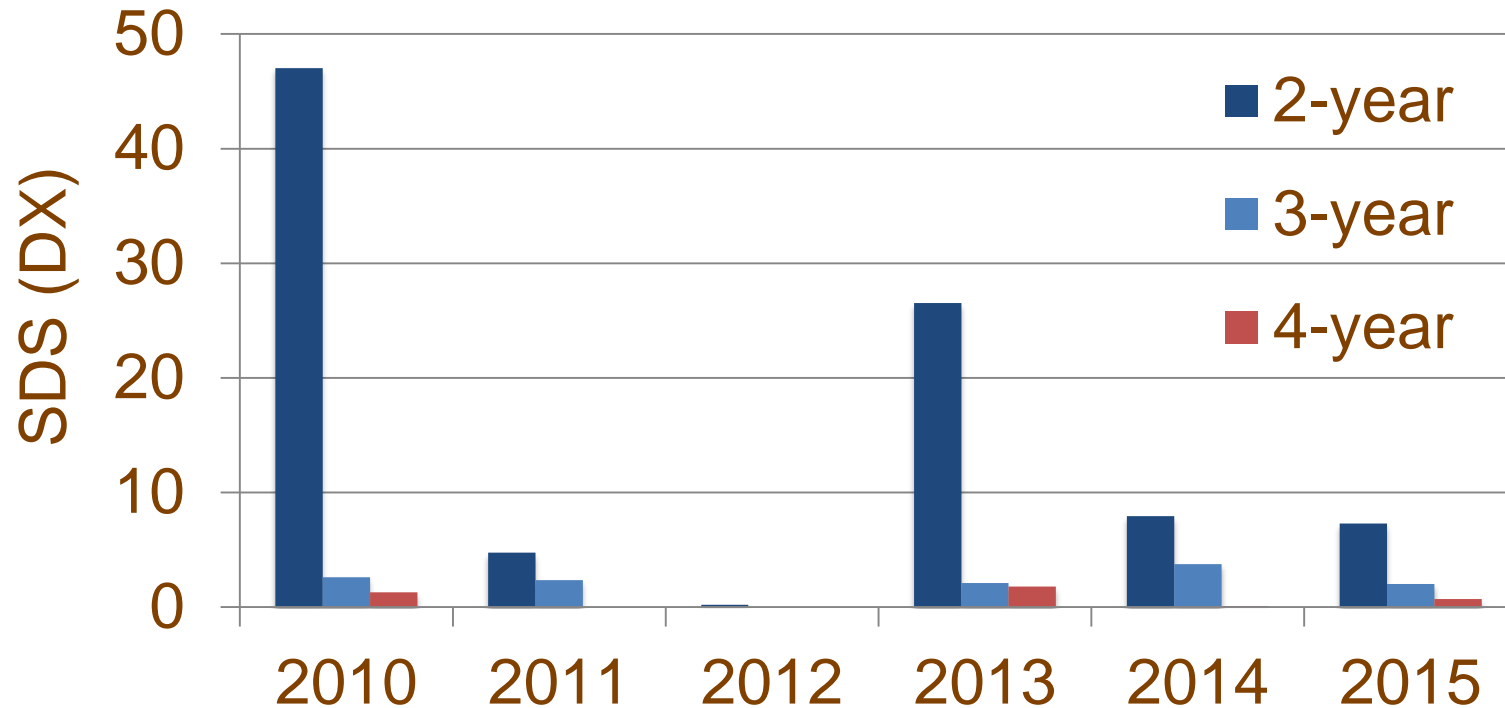
- 2-year rotation: corn-soybean
- 3-year rotation: corn-soybean-oat/red clover
- 4-year rotation: corn-soybean-oat/alfalfa-alfalfa



3-year rotation (left) / 2-year rotation (right)



Long Term Crop Rotation



THANKS!

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