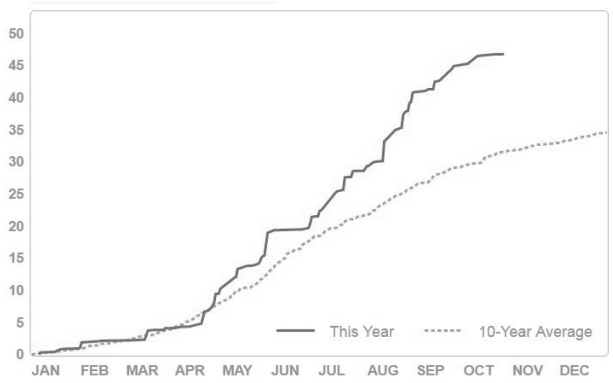
ILeVO® Seed Treatment for Sudden Death Syndrome

Study ID: 607127201601
County: Nemaha
Soil Type: Dockery silt loam; McPaul silt loam
Planting Date: 5/19/16
Harvest Date: 10/22/16
Population: 140,000
Row Spacing (in): 30
Hybrid: Asgrow 3936
Reps: 4
Previous Crop: Corn
Tillage: No-Till
Herbicides: Authority®, Roundup PowerMax®, Cobra®
Foliar Insecticides: None
Foliar Fungicides: None

Fertilizer: None
Irrigation: None
Rainfall (in):



Soil Sample Results:

ID	Soil pH 1:1	Modified WDRF BpH	Soluble Salts 1:1 mmho/cm	Excess Lime Rating	FIA Nitrate ppm N	Nitrate Lb N/A for 0-8 in	M-P3 ppm P	----Ammonium Acetate--- ----------ppm---------- K	Ca	Mg	Na	Sum of Cations me/100g	% Base Saturation H	K	Ca	Mg	Na
Rep 1	6.1	6.9	0.19	None	21.3	51	18	218	1857	391	32	14.1	6	4	66	23	1
Rep 2	6.1	7.0	0.19	None	20.9	50	19	214	1880	375	24	14.3	8	4	65	22	1
Rep 3	5.7	6.9	0.14	None	18.4	44	22	207	1877	394	24	14.7	10	4	63	22	1
Rep 4	5.8	6.7	0.14	None	17.9	43	22	232	1809	389	22	15.6	17	4	58	21	1

Introduction: Sudden Death Syndrome (SDS) is caused by the soil borne fungus Fusarium solani f. sp. glycines. While this is a relatively new disease for Nebraska soybean farmers, there are several locations in the state where significant percentages of fields are being affected. Disease symptoms can be more severe in fields where both SDS and soybean cyst nematode (SCN) are present. There are not clear guidelines to determine at what point a field will have enough increase in yield to justify treatment, therefore, on-farm research projects like this one are needed.

ILeVO® is a seed treatment marketed by Bayer CropScience for SDS and also has nematode activity (label at right). This field was selected due to the presence of SDS in the 2014 soybean crop. Three treatments were selected to test the efficacy of the ILeVO® seed treatment.

GROUP 7 FUNGICIDE

A systemic seed treatment for use on soybean for the protection against damage caused by early season plant pathogenic nematodes. As a soybean seed treatment provides protection from seedling infections by *Fusarium virguliforme*, the causal agent of Sudden Death Syndrome.

ACTIVE INGREDIENT:
FLUOPYRAM: *N*-[2-[3-chloro-5-(trifluoromethyl)-2-pyridinyl]ethyl]-2-(trifluoromethyl)benzamide* **48.4%**
OTHER INGREDIENTS: **51.6%**
Contains 5 lbs FLUOPYRAM per gallon (600 g FLUOPYRAM per liter) **TOTAL: 100.0%**
*(CAS Number 658066-35-4)

EPA Reg. No. 264-1167

Product information from: *http://www.agrian.com/pdfs/ILeVO_Label1.pdf*

A: Untreated check

B: Standard soybean treatment (for this study Cruiser Maxx® Fungicide and Insecticide)

C: Standard soybean treatment plus ILeVO® at a rate of 1.18 fl oz/140,000 seed unit

Phosphorus samples (above) were taken because low phosphorus has been linked to higher severity of SDS. Soybean cyst nematode samples were also taken early in the growing season in each treatment and replication because of the relationship between SDS and SCN *(Table 1)*. This information is intended to provide a base population level for the trial.

Table 1. Average soybean cyst nematode counts for each replication.

	Soybean Cyst Nematode (SCN) - (# eggs/100 cc soil)
Check	0 A
Standard	0 A
Standard plus ILeVO	0 A
P-Value	-

Results: Foliar disease symptoms were assessed using Southern Illinois University at Carbondale's Method of SDS scoring. The disease symptoms were assessed using a 1 to 9 scoring system, with a score of 1 indicating the least symptoms and 9 indicating premature death. In addition, the overall incidence of affected plants was determined. These two scores were combined to create the disease index (DX). DX = disease incidence x disease severity/9. Disease assessments were conducted on 8/24/16 at stage R5.2 and 9/6/16 at stage R5.9 *(Table 2)*.

Table 2. SDS ratings taken on Aug. 24, 2016 and Sept. 6, 2016.

	Disease Incidence (%)	Disease Severity	Disease Index (DX)	Disease Incidence (%)	Disease Severity	Disease Index (DX)
	----------Aug. 24, 2016----------			----------Sept. 6, 2016----------		
Check	6.7 A	2.67 AB	2 A	18.8 A	5.67 A	12 A
Standard	6.7 A	3.17 A	2 A	22.1 A	5.83 A	14 A
Standard plus ILeVO	4.4 A*	1.83 B	1 A	8.0 B	5.42 A	5 B
P-Value	0.285	0.0298	0.1111	0.0013	0.3742	0.0007

*Values with the same letter are not significantly different at a 90% confidence level.

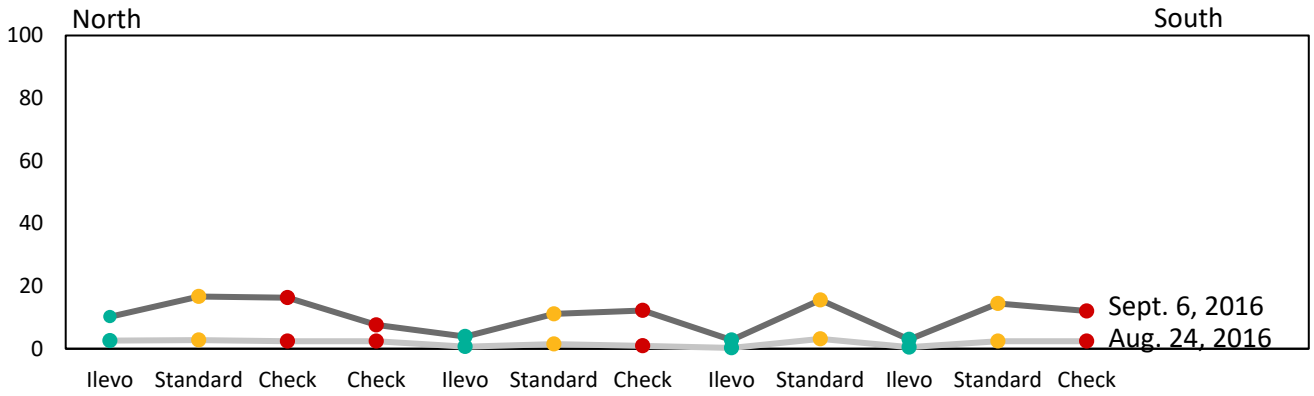


Figure 1. Disease index average by treatment from Aug. 24, 2016 and Sept. 6, 2016. Disease index scale ranges from 0 to 100.

Aerial imagery was captured on September 20, 2016. True color imagery is shown in Figure 2 and false color imagery is shown in Figure 3. Imagery was used to calculate the normalized difference vegetation

index (NDVI). This index is correlated with the greenness of the plant and plant health. NDVI values for the 3 treatments *(Figure 4)* were compared *(Table 3)*. Areas where plant stand had been eliminated due to crop residue carried by water were removed from the NDVI image before analysis and a 10 foot buffer was applied between treatments as shown in Figure 4.

Figure 2. True color image of study area with treatments labeled.

Figure 3. False color image of study area with treatments labeled. Brighter red indicates more green vegetation.

Figure 4. Normalized difference vegetation index (NDVI) for each treatment.

Table 3. NDVI average by treatment from aerial imagery on Sept. 20, 2016.

	NDVI
Check	0.641 B
Standard	0.638 C
Standard plus ILeVO	0.645 A
P-Value	0.0008

Yield was recorded using a yield monitor. Yield data was cleaned using Yield Editor 2.0 (USDA-ARS, Columbia, MO). Averages for each treatment strip are shown in Figure 5. Averages by treatment are shown in Table 4.

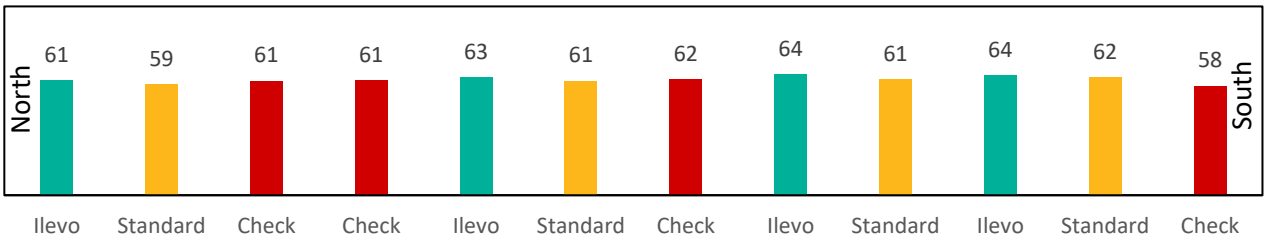


Figure 5. Yield average by treatment (bu/ac) from north to south.

Table 4. Harvest stand counts, yield from yield monitor, and marginal net return.

	Harvest Stand Count	Yield† (bu/ac)	Marginal Net Return‡ ($/ac)
Check	82,833 A	60 A	555.00
Standard	81,667 A	61 A	550.25
Standard plus ILeVO	86,250 A	63 A	555.87
P-Value	0.8291	0.1101	N/A

†Yield corrected to 13% moisture
‡Marginal net return based on $9.25/bu soybeans, $14/140,000 seed unit for Cruiser Maxx treatment (in this study also $14/ac), and $12.88/140,000 seed unit for ILeVO treatment (in this study also $12.88/ac).

Yield was summarized by soil series as shown in Figure 6 and Table 5.

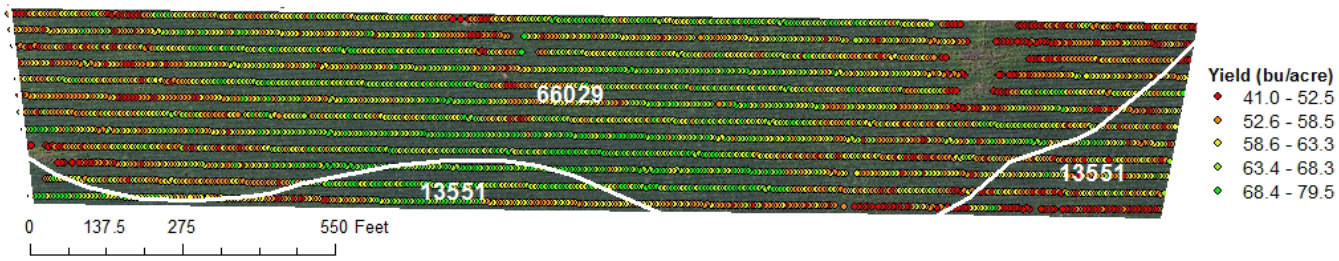


Figure 6. Yield data with soil map unit.

Table 5. Yield by treatment and soil map unit.

Map Symbol	Map Unit	Check	Standard	ILEVO	Check	Standard	ILEVO
		Percent of Trial			Yield (bu/acre)		
13551	McPaul silt loam, 0 to 2 percent slopes, occasionally flooded	19%	16%	11%	58.5	61.4	63.9
66029	Dockery silt loam, 0 to 2 percent slopes, occasionally flooded	81%	84%	89%	60.7	60.6	62.6

*Yield differences for map units with small areas may not be representative.

Summary: At this site, SDS disease incidence and severity developed late in the growing season and was considered low throughout the year. NDVI from aerial imagery was significantly different with the ILeVO treatment having higher NDVI than the standard treatment and the check. There was no yield difference between the treatments with ILeVO and without. Additionally, the standard treatment did not provide a yield benefit over the check. More research on the disease severity, timing of disease symptoms, and spatial distribution throughout the field is needed to aid in determining where an economic response to ILeVO can be expected.

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