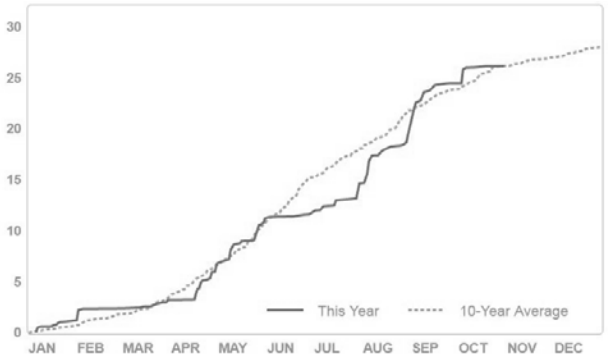
ILeVO® Seed Treatment for Sudden Death Syndrome

Study ID: 605035201601
County: Clay
Soil Type: Hastings silt loam;
Planting Date: 4/28/16
Harvest Date: 9/22/16
Population: 185,000
Row Spacing (in) 30
Hybrid: Fontanelle 64R20
Reps: 4

Irrigation: Pivot, Total:
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	6.4	6.9	0.33	None	16.7	40	71	489	2127	241	54	16.4	13	8	66	12	2
Rep 2	6.5	7.0	0.28	None	13.9	34	42	529	2415	308	56	16.8	4	8	72	15	2
Rep 3	6.4	7.0	0.32	None	14.3	35	30	484	2429	346	49	17.4	5	8	70	17	1
Rep 4	6.4	7.0	0.34	None	18.6	45	48	454	2145	242	49	14.8	5	8	72	14	2

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 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. Two 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: Standard soybean treatment (for this study Acceleron® Fungicide and Insecticide)

B: 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 (SCN) 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. Soybean cyst nematode samples for each treatment and replication.

	Soybean Cyst Nematode (SCN) - (# eggs/100 cc soil)
Standard	0 A
Standard + 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 8/15/16 at stage R5.6 and 9/1/16 at stage R6.2 *(Table 2).*

Table 2. SDS ratings taken on Aug. 15, 2016 and Sept. 1, 2016.

	Disease Incidence (%)	Disease Severity	Disease Index (DX)	Disease Incidence (%)	Disease Severity	Disease Index (DX)
	----------Aug. 15, 2016----------			----------Sept. 1, 2016----------		
Standard	8.5 A*	2.75 A	3 A	29.6 A	5.00 A	19 A
Standard + ILeVO	0.9 B	0.75 B	0 B	9.6 B	2.50 B	3 B
P-Value	0.0302	0.0098	0.0702	0.0007	0.002	0.0008

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

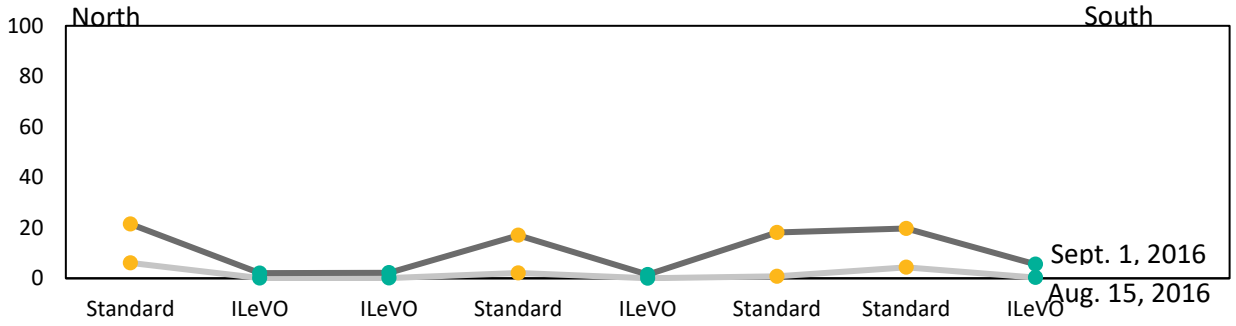


Figure 1. Disease index average by treatment from Aug. 15, 2016 and Sept. 1, 2016. Disease index scale ranges from 0 to 100.

Aerial imagery was captured on 9/10/16. 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)*. Pivot tracks were removed from the NDVI image before analysis as shown in Figure 4.

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

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

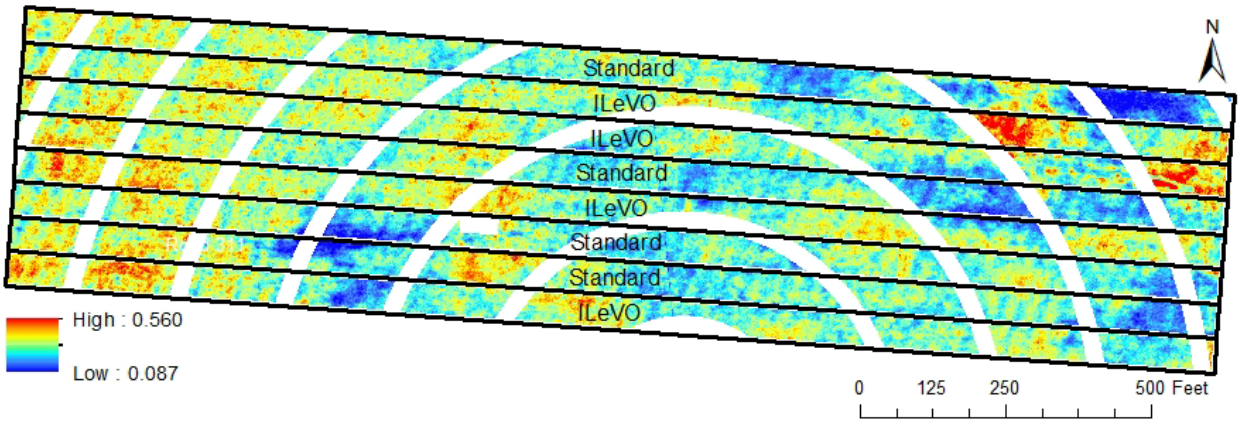


Figure 4. Normalized difference vegetation index (NDVI) for each treatment.

Table 3. NDVI average by treatment from aerial imagery on Sept. 10, 2016.

	NDVI
Standard	0.231 B
Standard + ILeVO	0.253 A
P-Value	0.01

Yield was recorded using a yield monitor. Yield data was cleaned to remove areas corresponding with pivot tracks and data values below 40 bu/ac and above 110 bu/ac. Averages for each treatment strip are shown in Figure 5. Averages by treatment are shown in Table 4; averages by treatment for each soil series in the field are shown in Table 5.

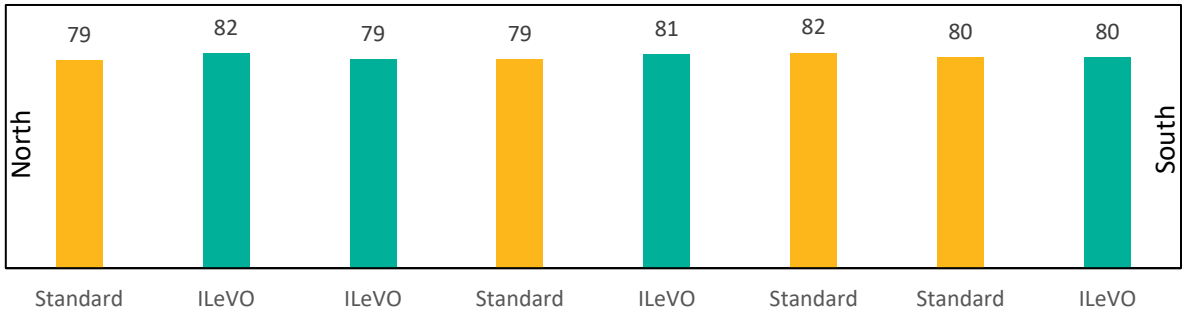


Figure 5. Yield average by treatment (bu/ac) from north to south.

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

	Yield (bu/acre)†	Harvest Stand Count	Marginal Net Return‡ ($/ac)
Standard	80 A	116,500 A	740.00
Standard + ILeVO	81 A	110,000 A	732.24
P-Value	0.4931	0.2485	N/A

†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $9.25/bu soybean and $17.01/ac for ILeVO seed treatment (based on $10.91/oz and application rate of 1.18 fl oz/140,000 seed unit).

Yield difference is not statistically different at 10% significance level.

Yield was summarized by soil series as shown in Figure 6 and Table 4.

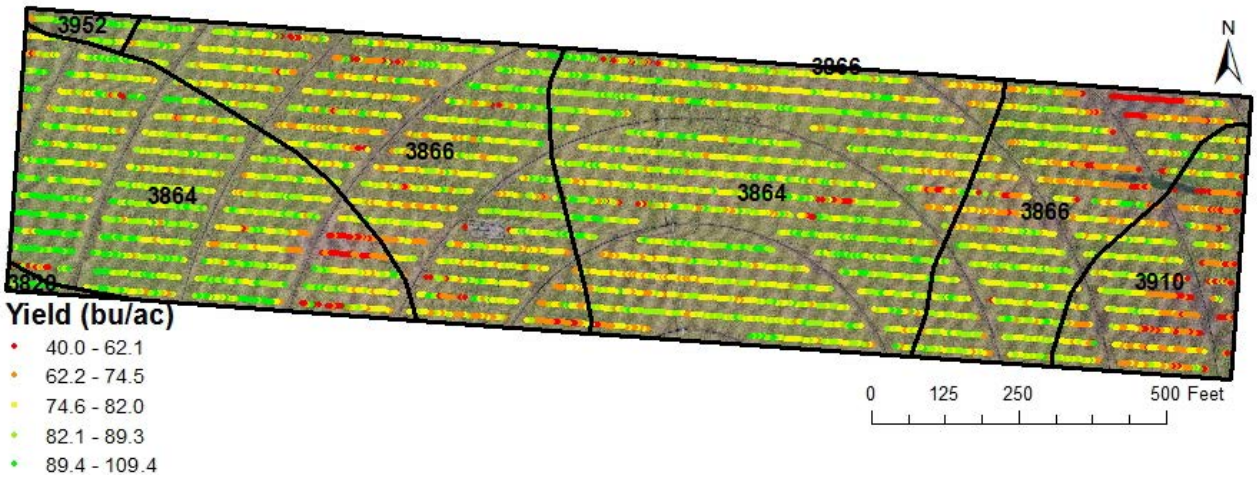


Figure 6. Yield data with soil map unit.

Table 5. Yield data with soil map unit.

Map Symbol	Map Unit	Standard	ILEVO	Standard	ILEVO
		Percent of Trial		Yield (bu/acre)	
3820	Butler silt loam, 0 to 1% slopes	0%	1%		92.2
3864	Hastings silt loam, 0 to 1% slopes	53%	53%	82.0	82.3
3866	Hastings silt loam, 1 to 3% slopes	36%	37%	78.4	79.1
3910	Scott silt loam, frequently ponded	9%	9%	72.2	76.1
3952	Fillmore silt loam, frequently ponded	2%	0%	87.7	

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

Summary: At this site, SDS disease incidence and severity was greater for the standard treatment than for the ILeVO treatment, but disease pressure was considered to be low for both treatments. At the time of the second disease rating, this difference between the treatments was greater. Normalized difference vegetative index was calculated from aerial imagery and showed higher NDVI values for the ILeVO treatment. Yield data did not show a significant difference between the standard and ILeVO treatments. When looking only at the eastern ~1/3 of the field, where symptoms were visually more severe, the ILeVO seed treatment had a greater yield response (for example, in the soil map unit 3910 in Table 5). Disease severity, timing of development, and amount of the field affected all contribute to the likelihood of seeing a positive effect from the ILeVO seed treatment. Additional studies are needed to determine areas likely to see a response to the seed treatment and to establish thresholds for treatment.

This study was sponsored in part by: Bayer CropScience LP