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K-State research on seed treatments for Sudden Death Syndrome in soybeans

Soybean Sudden Death Syndrome (SDS) is a disease caused by the soilborne fungus *Fusarium virguliforme*. This fungus prefers wet conditions and thus is usually most severe in irrigated fields, although it can and has occurred in non-irrigated fields in Kansas. SDS tends to be most severe on well-managed soybeans with a high yield potential. It also tends to be more prevalent in fields that are:

- Infested with soybean cyst nematode
- Planted early when soils are wet and cool

There is no easy way to completely control SDS. Effective management of SDS requires an integrated approach. Management should start with the planting of SDS resistant varieties, but this provides only limited options. Most varieties are susceptible to some degree; very few have good resistance.

Although the presence of SDS is strongly correlated with the presence of soybean cyst nematode, it is not possible to manage SDS simply by selecting varieties that have soybean cyst nematode resistance. Some varieties with resistance to soybean cyst nematode are susceptible to SDS and some varieties that are susceptible to soybean cyst nematode are resistant to SDS. Ideally, producers should select varieties that have both resistance to SDS and to multiple races of soybean cyst nematode. There are only a limited number of such varieties available. Results of screening trials for many commercial varieties for both SDS and SCN can be found at: <http://www.agronomy.k-state.edu/services/crop-performance-tests/soybean/index.html>.

Cultural management practices that can reduce the risk of SDS infection include delaying planting until soil temperatures are warmer, avoiding planting into overly wet soils, and reducing compaction problems within a field. Producers who have fields with compaction problems should make every effort to correct that problem before planting soybeans next season. Do not delay planting beyond the normal optimal time since yield losses due to delayed planting may exceed the losses from the disease alone. SDS infested fields should be the last fields planted within the normal planting time.

Crop rotation also seems to have some positive effect on SDS, but only if the field is not planted to soybeans for four years or more.

One promising method of controlling SDS is the use of new seed treatments. Recent research with seed treatments on soybeans in 2014 and 2013 has shown some promising results in tests at K-State's Kansas River Valley Experiment Field. These studies were planted in fields with a long history of SDS, and irrigated earlier and more often than normal to promote the disease.

2014 results

In this study, ILeVO -- a new seed treatment from Bayer CropScience, Fluopyram 600 FS -- was applied to a soybean variety with a high level of tolerance to SDS, Stine 43RE02. The most severely infested plots had more than 50% of the leaf area expressing symptoms of SDS by the R6 growth stage. Treatments with ILeVO reduced the amount of foliar symptoms and increased yields up to 12 bu/acre, or more than 25%.

Table 1. Influence of ILeVO seed treatment for SDS (Bayer CropScience) on yield of SDS-resistant soybean variety, Kansas River Valley Experiment Field-Rossville, 2014

Seed treatments	Yield (bu/acre)	SDS severity (% leaf area at R6)
Poncho/VOTiVO check	47.4	52
ILeVO (0.15 mg/seed) + Poncho/ VOTiVO	59.6	16
ILeVO (0.075 mg/seed) + Poncho/ VOTiVO	57.0	31
Gaucho 600 check	54.0	25
ILeVO (0.15 mg/seed) + Gaucho 600	57.2	16
ILeVO (0.075 mg/seed) + Gaucho 600	57.1	7
LSD (0.05)	3.7	22.9

Source: Adee, E.A. (2015) "Effects of Seed Treatment on Sudden Death Syndrome Symptoms and Soybean Yield," *Kansas Agricultural Experiment Station Research Reports*: Vol. 1: Iss. 2. <http://newprairiepress.org/kaesrr/vol1/iss2/3/>

Another study in 2014 had treatments with an experimental seed treatment from DuPont. This product reduced the amount of foliar disease from over 70% of leaf area with SDS symptoms to less than 30% on two susceptible varieties, and increased yields up to 10 bu/acre, or more than 25%. The two varieties reacted similarly to the seed treatment, so the table below presents the average of both varieties.

Table 2. Influence of DuPont experimental seed treatment for SDS on yield of SDS-resistant soybean variety, Kansas River Valley Experiment Field-Rossville, 2014

Seed treatments	Yield (bu/acre)	SDS severity (% leaf area at R6)
Untreated check	29.6	71.1
DuPont experimental treatment (0.65x)	29.7	39.1
DuPont experimental treatment (1.0x)	31.9	45.3
DuPont experimental treatment (2.0x)	35.3	41.0
DuPont experimental treatment (3.0x)	40.0	26.6
LSD (0.05)	4.8	15.7

Source: Adee, E. A. (2015) "Effects of an Experimental Seed Treatment from DuPont on Sudden Death Syndrome Symptoms and Soybean Yield," *Kansas Agricultural Experiment Station Research Reports*: Vol. 1: Iss. 2. <http://newprairiepress.org/kaesrr/vol1/iss2/4/>

2013 results

In 2013, the ILeVO seed treatment was applied to three soybean varieties of with different levels of tolerance to SDS. The most severely infested plots had more than 80% of the leaf area expressing symptoms of SDS by the R6 growth stage. The seed treatment reduced the amount of foliar disease in all varieties and increased yields up to 16 bu/acre, or more than 40% (Table 3).

Table 3. Influence of soybean variety and seed treatment on SDS, Kansas River Valley Experiment Field–Rossville, 2013

	Soybean varieties					
	Most resistant	Moderately resistant	Susceptible	Most resistant	Moderately resistant	Susceptible
Seed treatment	Yield (bu/acre)			SDS severity (% leaf area at R6)		
None	28.6	29.2	21.3	18%	44%	63%
ILeVO* at 0.25 mg/seed	41.6	39.7	37.4	4%	28%	45%
ILeVO at 0.15 mg/seed	42.9	41.0	26.2	5%	28%	72%
LSD 0.05	8.3			17.4		

Summary

Having products that can protect the soybean plant against SDS and reduce yield loss will be a very important tool for growers to have in their arsenal to improve soybean yields in fields with a history of SDS. Combining these products with variety selection will help reduce yield loss to SDS, and improve the profitability of soybeans. The Bayer product, ILeVO, is on the market in limited quantities this year. The DuPont experimental product may be a year or two away from being made available to growers.

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