

**Table 1.** Kansas Soybean Variety Trial germplasm rated as toxin tolerant or susceptible and non-senescent or senescent. (Ratings were based upon the SDS severity scale where 1-2 = healthy or mildly chlorotic seedlings; 3-6 = chlorotic, necrotic, wilted, or dead seedlings.)

	<b>Non-senescent (1-2)</b>	<b>Senescent (3-6)</b>
<b>Toxin tolerant (1-2)</b>	Asgrow (AG4232); Credenz (CZ 3548 LL, CZ 3738 LL, CZ 3841 LL, CZ 4308 LL, CZ 4918 LL, HBK LL 4953); Dyna Gro (S37XT28, S38RY87); Frontier Seed (4SR82); Kansas AES (K12-2333, K4313NRRT, KS5507NRR); LG seeds (C3489RX, C3775RX); Midland (3537NX, 4328NX, 4373NR2; Phillips (408NR2XS, 456NR2XS); Syngenta (GH3195x, GH3985x); Willcross (WX1445NLL, WX1745NLL, WXE3437N, WXE3466NS).	Kansas AES (KS5502N); Public (LS09-1920)
<b>Toxin susceptible (3-6)</b>	Arkansas (Osage, R09-430, R13-1019, UA 5014 C, UA 5414RR); Asgrow (AG 5335); Credenz (CZ 3601 LL, CZ 4222 LL, CZ 4748 LL); Dyna Gro (S35XT97, S49XS88, S46xS87, S48XS78); Emerge Genetics (e4996s); Frontier Seed (3SR92, 49GT02, 4SR62, 41GT37); Kansas AES (K12-2333, K13-1830, K12-1348, KS5004N, KS3406RR); LG Seeds (C4227RX, C4458 RX); Midland (3633NR2, 3657NRZ, 3926NRS2, 3983NRZ, 4677NXS, 4797NRS2, 4956NXS); Morsoy (4426 RXT, 4857RXT, 4963NRS2, 4737 RXT, 4117RXT, 4706RXT); Phillips (348NR2X, 411NR2Y, 387NR2X, 363NR2YE, 478NR2XSE); Public (LD06-7862, Ripley, Spencer); Syngenta (GH3546x, GH3324x, GH4307x, GH4542x, GH2981x); Willcross (WXE3367N, WXE3386N, WXE3487NS, WXE3497NS, WXE3377ND, WXE3446NS, WX1441NLL).	Asgrow (AG3432); Kansas (AES K11-2363B, KS4313 N, KS4117NS, K12-1355, K13-1615); Credenz (CZ4105 LL, CZ 4548LL, CZ 4938 LL); Dyna Gro (S39XT68, S43XS27); Emerge Genetics (e3796, e4394, N4746s, e4766s, e4892s, e4993s, T4846s); LG Seeds (C3026RX, C3333RX, C3550 RX, C3985 RX, C4615 RX); Midland (3938NX); Missouri (S13-1805C, S13-1955C, S13-3851C, S13-2743C, S13-10590C, S14-9051R); Morsoy (4327 RXT, 4535RXT, 4667 RXT, 4997 RXT, 3907 RXT); Phillips (306NR2XS, 454R2YSE); Public (Morgan); Syngenta (GH3982x, GH3761X, NK S39-T2, NK S39-T3); Willcross (WXE3517NS).

**Figure 1.** Examples of the culture extract/toxin assay with accompanying senescence and toxin sensitivity ratings.



'KS5507 NRR' (non-senescent & toxin resistant)



'KS 13-1830' (non-senescent & toxin susceptible)



'Morgan' (senescent & toxin susceptible)

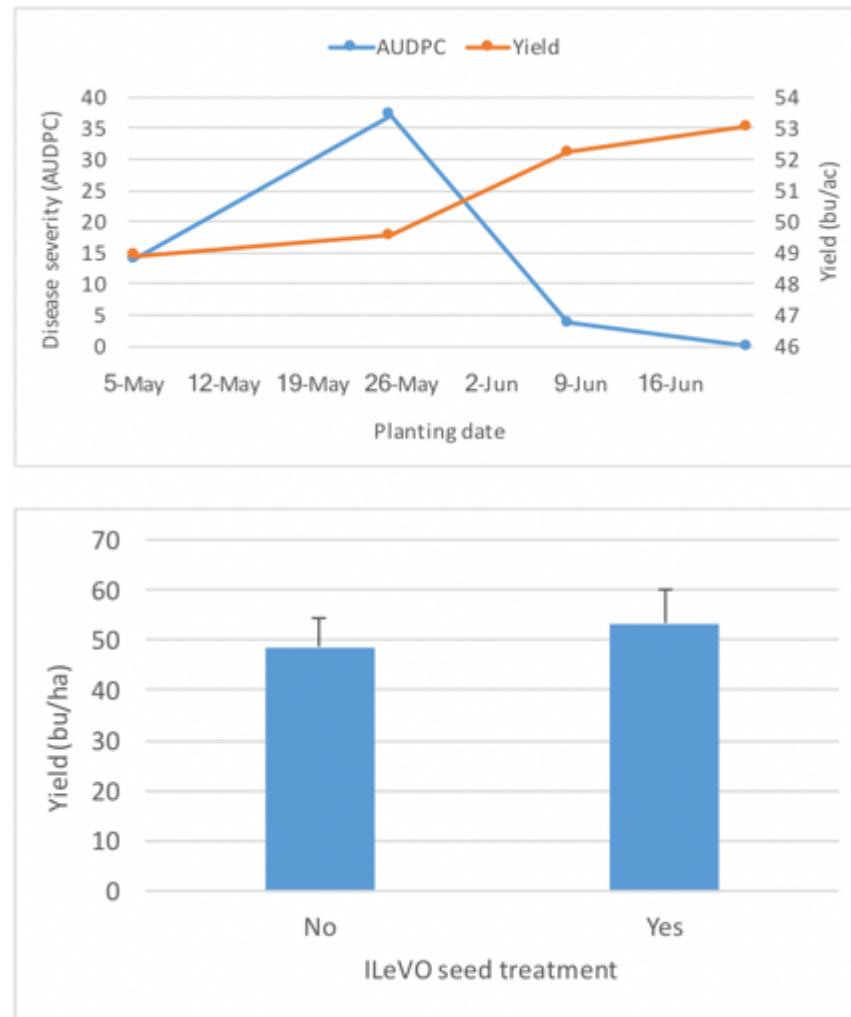
**Figure 2.** Example of rolled-towel screening method for soybean seedlings.



**Figure 3.** Example of "layer-cake" screening assay. Seedlings with characteristic SDS symptoms are visible.



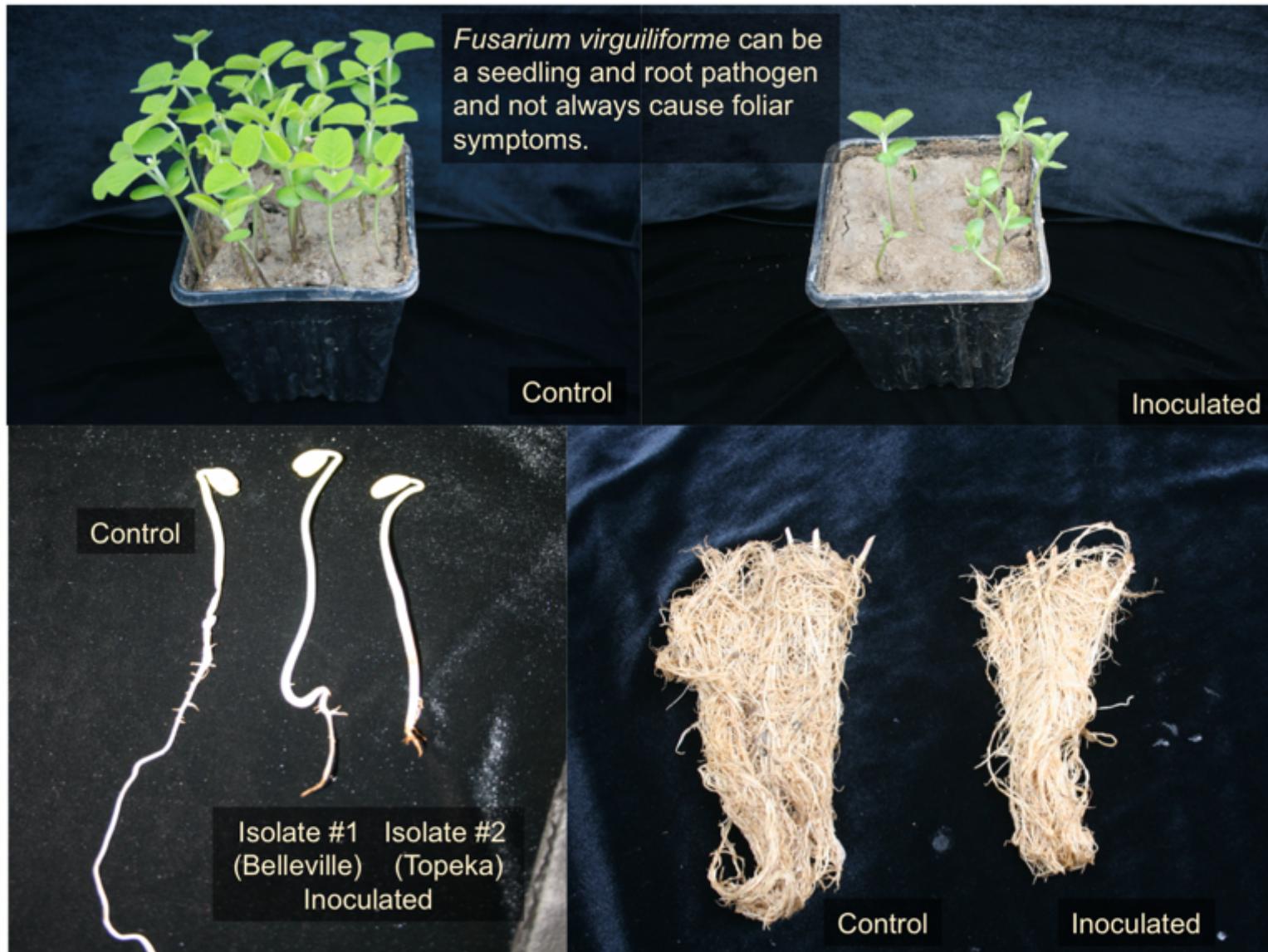
**Figure 4.** Results for the 2017 field experiment testing planting date and ILeVO seed treatment for SDS in Topeka (Silver Lake), Kansas.



**Figure 5.** Collection, processing, and isolation of *Fusarium* spp. from corn residues. (Colonies with asterisks (lower right) were thought to be *F. virguliforme* upon first inspection, but molecular methods have revealed that these are likely *F. solani* and not the SDS pathogen.)



**Figure 6.** Examples of *F. virguliforme* isolates causing seedling disease and root rot.



**Table 2.** Potential *F. virguiforme* isolates collected during this study and seedling disease assay results (1.000-2.999 = low germination & low root length); 3.000-4.999 = medium germination & medium root length; 5.000+= germination & root length similar to water-inoculated control).

Isolate #	Seedling disease assay
FV0009	<b>2.734 (pathogenic)</b>
FV0012	3.470 (moderately pathogenic)
FV0013	<b>2.548 (pathogenic)</b>
FV0014	<b>2.395 (pathogenic)</b>
FV0022	<b>2.921 (pathogenic)</b>
FV0028	3.149 (moderately pathogenic)
FV0030	<b>2.672 (pathogenic)</b>
FV0039	5.512 (non-pathogenic)
FV0040	4.582 (moderately pathogenic)
FV0042	3.704 (moderately pathogenic)
FV0044	3.690 (moderately pathogenic)
FV0046	5.928 (non-pathogenic)
FV0047	<b>2.547 (pathogenic)</b>
FV0048	4.101 (moderately pathogenic)
FV0049	3.787 (moderately pathogenic)
FV0050	4.274 (moderately pathogenic)
FV0052	3.975 (moderately pathogenic)
FV0054	4.697 (moderately pathogenic)
FV0056	4.795 (moderately pathogenic)
FV0058	4.092 (moderately pathogenic)