Sudden Death Syndrome and Soybean Planting Date

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Summary

The effect of soybean planting date on the severity of sudden death syndrome (SDS) and yield were evaluated in two studies at the Kansas River Valley Experiment Field in 2015. One study was established to promote SDS and the other to minimize SDS. In both studies the severity of SDS was greatest with the earlier planting dates, except for the more tolerant variety. The yield was greatest with the earlier planting date, except for the most susceptible variety. The severity of SDS was not as great as had been observed in previous years.

Introduction

Soybean planting dates have been moving increasingly earlier in much of the soybean-growing region, including Kansas. Yield increases due to earlier planting dates of soybeans have been shown in many soybean growing regions. However, in the Kansas River Valley, many of the soybeans have been planted after mid-May because of the perennial problem with SDS on soybeans. Later planting has been prescribed to help avoid the cooler/wetter soils that can favor infection by the fungus *Fusarium virguliforme*, the causal agent of SDS. Two soybean planting date studies were conducted at the Kansas River Valley Experiment Field at Rossville in 2015. One was specifically looking at SDS infection, and the other was targeting best management practices for soybean production. Both had foliar symptoms of SDS develop during the growing season.

Procedures

SDS Planting Date Study

Management practices to promote SDS, such as early and greater volume of irrigation, were utilized in this study. Soybean were planted on four different dates into a field with a history of SDS at the Rossville Unit of the Kansas River Valley Experiment Field in 2015. Two soybean varieties, SDS susceptible KS 3406 RR and SDS tolerant Pioneer P35T58, were planted on April 30, May 13, June 9, and June 22 at 140,000 seeds/a into 10- × 30-ft plots, with four replications in a randomized complete block design. The soil was Eudora silt loam, and the previous crop was corn. Irrigation with a linear-move sprinkler irrigation system was started on June 24. Total irrigation was 2.82 in., and 33.9 in. of rain was received during the growing season. Preemergent herbicide applied at planting was Authority Maxx (FMC Corporation Agricultural Products Group, Philadelphia, PA) (5 oz), Dual II Mag (Syngenta Crop Protection, LLC, Greensboro, NC) (1.5 pt) and Liberty (Bayer CropScience, Research Park Triangle, NC) (32 oz). Postemergent herbicide was Roundup PowerMax (Monsanto Company, St. Louis,

MO) (6 oz), Extreme (BASF, Research Park Triangle, NC) (3 pt), and Outlook (BASF) (12 oz). Foliar symptoms of SDS were rated weekly starting July 29, when the soybean were at R3 (beginning pods), until R6 (full seed) for all planting dates. Ratings were based on incidence and severity of the symptoms resulting in percent defoliation. An area under the disease progress curve (AUDPC), a unitless number describing the development of defoliation effects over time, was derived by plotting periodic measurements of disease over time and integrating the area under the disease curve. The harvest of the two middle rows of all planting dates was completed by October 12.

Best Management Practice Study

Management practices to reduce or avoid SDS were implemented in this study. These include treating the seed with ILeVO (Bayer) (35 ml/unit of seed) to protect against SDS and withholding irrigation until the crop was getting close to moisture stress. Three soybean varieties of differing maturities were planted on three different dates. The varieties were Asgrow (Monsanto) AG 3034 (MG 3.0), AG 3731 (MG 3.7), and AG 4534 (MG 4.5). These were planted on April 30, May 13, and June 9 at 140,000 seeds/a into 10- × 30-ft plots, with four replications in a randomized complete block design. This field was irrigated once on Sept. 1, receiving 0.7 in.. Soil type, rainfall, herbicide program, data collection and harvest were the same as with the SDS planting date study mentioned previously.

Results

The severity of SDS was greatest with the early planting dates in both studies (Figure 1 and 3), decreasing to very little SDS with the June planting dates with the varieties having average or below average tolerance to SDS. The P35T58R is rated by the company as above average tolerance, and very few symptoms of SDS were present in the variety at any planting date (Figure 1). These data confirm that earlier planting dates can result in more severe symptoms of SDS.

Compared to research conducted in previous years, the SDS was not as severe. For example, the P35T58 averaged less than 5% of the leaf area with symptoms on August 27, while in 2014 at a similar planting date averaged nearly 60% on August 25. Similarly, the very susceptible variety, KS 3406, averaged less than 75% on August 27, 2015 compared to over 90% on August 25, 2014. It is not clear why the SDS was not as severe as in previous years as the May through July rainfall (26.67 inches) was more than twice the 30-year average of 11.05. Additionally, the ILeVO seed treatment in the best management study may have helped reduce the severity of SDS.

The yields were also the greatest with the earlier planting dates in both studies (Figure 2 and 4) except for the most susceptible variety (Figure 2). Generally, there is a negative relationship between SDS and yield (i.e. the greater the SDS the lower the yield). However, in these experiments, the increased yield potential with the earlier planting dates may have helped counteract some of the yield loss due to SDS, especially when the SDS severity was reduced.

There was a greater yield advantage for the early planting in the best management planting date study, especially for the later maturity soybeans (Figure 3). Again, the severity

of the SDS wasn't as great in this study, allowing for more of the yield potential of the earlier planting of soybean to be realized.

Based on one year's data from two experiments, it appears that SDS is favored by earlier planting, though yield was increased as well. It will be interesting to see if the yield potential for early planting date is greatly reduced or if a yield benefit will still be realized in another year when the SDS is more severe. It could be that with more severe SDS the yield response to earlier planting date may look more like that of the very susceptible variety in Figure 2; fairly flat until the planting date is very late.

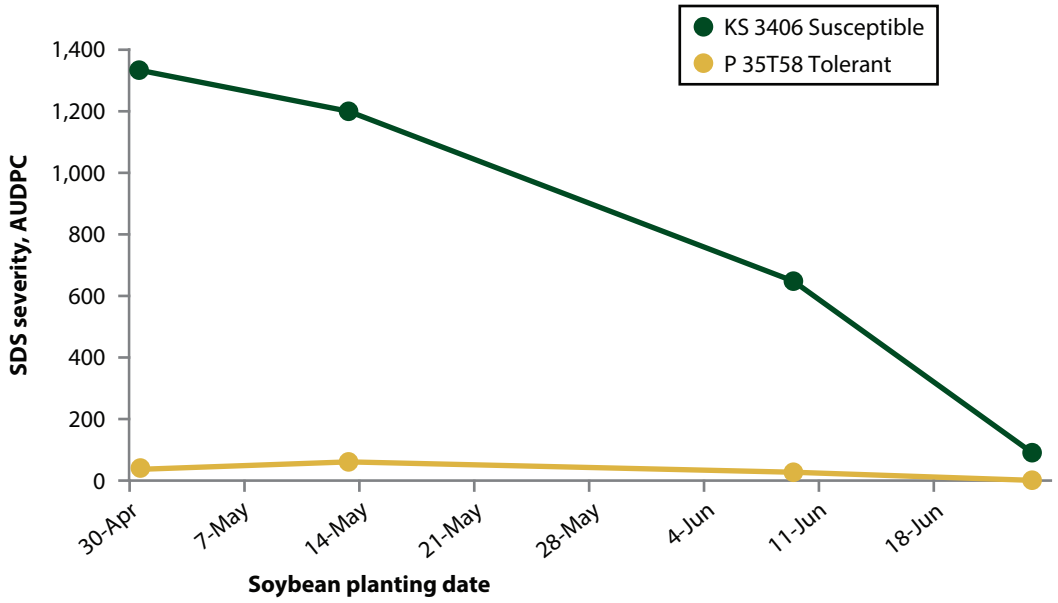

Figure 1. Effect of planting data for two soybean varieties on severity of Sudden Death Syndrome (SDS) measured as area under disease progress curve (AUDPC), Kansas River Valley Experiment Field 2015.

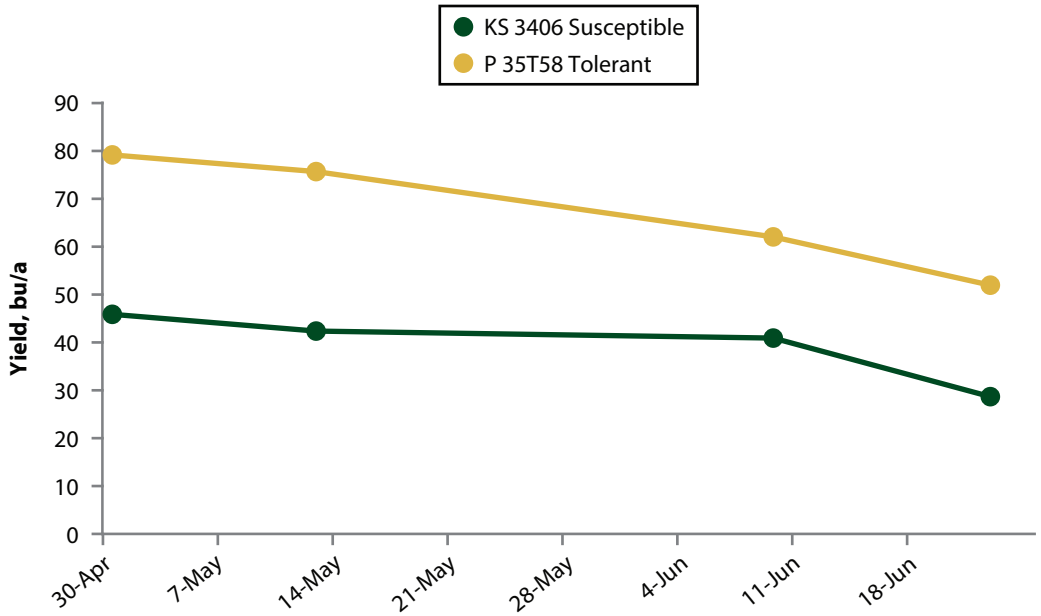

Figure 2. Effect of planting date for two soybean varieties on yield, Kansas River Valley Experiment Field, 2015.

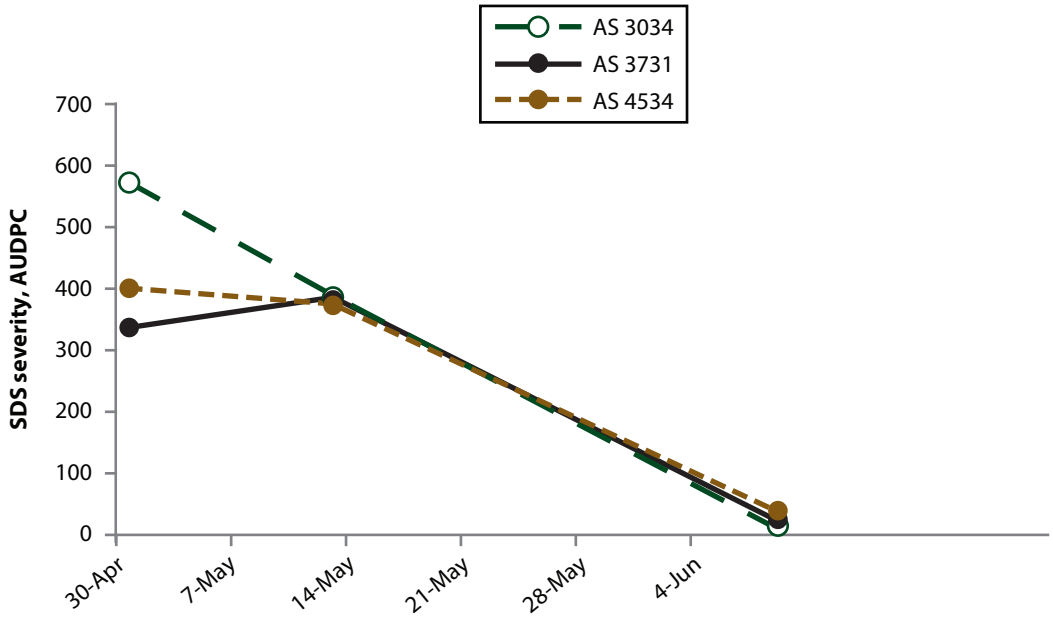

Figure 3. Effect of planting date on soybean varieties treated with ILeVO seed treatment on severity of Sudden Death Syndrome (SDS) as measured by area under disease progress curve (AUDPC), Kansas River Valley Experiment Field, 2015.

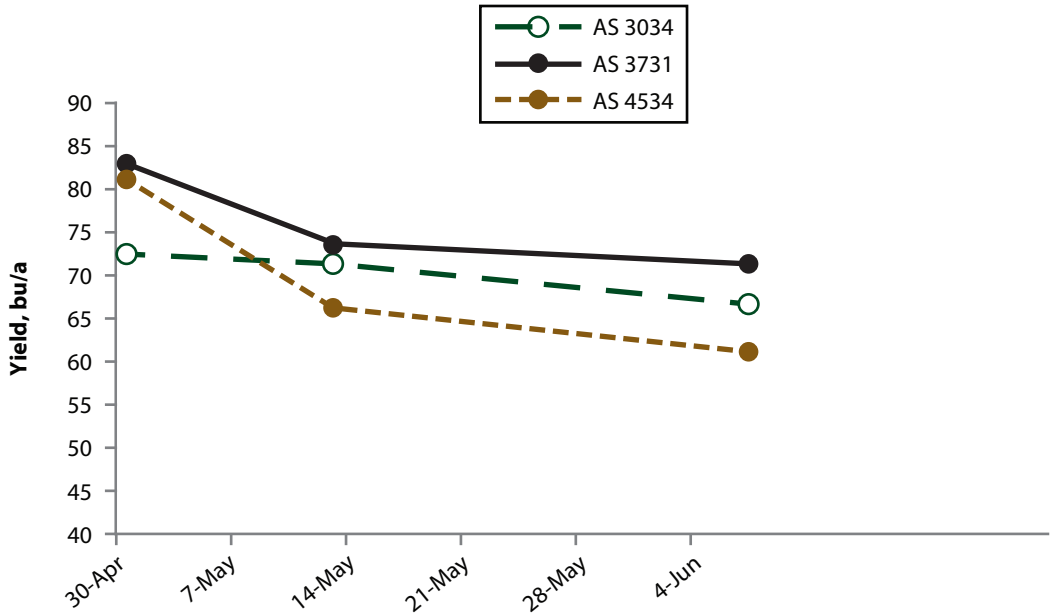

Figure 4. Effect of planting date on soybean varieties seed treated with ILeVO seed treatment on yield, Kansas River Valley Experiment Field, 2015.