
Sudden Death Syndrome and Soybean Planting Date

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Summary

The effect of planting date on severity of sudden death syndrome (SDS) and yield was evaluated for the second year in two studies at the Kansas River Valley experiment fields in 2016. 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. 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. There is a very positive benefit to planting in early May when measures are taken to reduce the severity of SDS, such as variety selection.

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 fields at Topeka in 2016. 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

Sudden Death Syndrome Planting Date Study

Management practices to promote SDS, such as early and greater volume of irrigation, were used in this study. Soybean were planted on four different dates into a field with a history of SDS at Rossville and Topeka units of the Kansas River Valley experiment fields in 2015 and 2016, respectively. Two soybean varieties, SDS-susceptible KS 3406 RR and SDS-tolerant Pioneer P35T58 were planted on average planting dates of May 3 and 18, June 9 and 22 at 140,000 seeds/a into 10- by 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, 2015, and June 25, 2016. Total irrigation was 2.8 in. during 2015 and 5.5 in. for 2016. There were 33.9 and 35.3 in. of rain received during the 2015 and 2016 growing seasons, respectively. Preemergent herbicide applied at planting was Author-

ity 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 herbicides were Roundup PowerMax (Monsanto Company, St. Louis, MO) (32 oz) and Outlook (BASF, Research Park Triangle, NC) (12 oz) (2015), or Zidua (BASF) (2 oz) (2016). Foliar symptoms of SDS were rated weekly starting July 29, 2015 at R3 (beginning pods) and August 8, 2016, when the soybean were at the R4 (full length 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, 2015 and October 13, 2016.

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 (September 1, 2015 and August 10, 2016). Three soybean varieties of differing maturities were planted on three different dates. The varieties were Asgrow (Monsanto) AG 3034 (MG 3.0) (2015 and 2016), AG 4534 (2015), AG 4531 (MG 4.5) (2016), and Pioneer 39T67R (MG 3.9) (2016). The average planting dates for both years were May 3 and 18, and June 8 at 140,000 seeds/a into 10- by 30-ft plots, with four replications in a randomized complete block design. Soil type, rainfall and herbicide programs were the same as with the SDS Planting Date Study mentioned previously. SDS ratings began on July 29, 2015 (beginning pods) and August 19, 2016 (R5, beginning seed fill). Harvest completed on October 12, 2015 and October 17, 2016.

Results

The severity of SDS was greatest with the early planting dates in both studies (Figures 1 and 3), decreasing to very little SDS with the June planting dates with the varieties having average or below average tolerance to SDS. Overall, SDS foliar symptoms developed later in 2016 than in 2015, resulting in a lower severity of SDS. However, the effect of planting date on SDS was consistent with all studies, confirming 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 both 2015 and 2016. For example, the P35T58 averaged less than 5% and 12% of the leaf area with symptoms on August 27 and 30 (R6) for 2015 and 2016, respectively; while in 2014 at a similar planting date averaged nearly 60% on August 25. Similarly, the very susceptible variety, KS 3406, averaged under 75% and 56%, for 2015 and 2016, respectively, compared to greater than 90% in 2014. It is not clear why the SDS was not as severe as in previous years, though the June rainfall was almost double the 30-year average in 2014, while 2015 was 50% above average and 2016 was 30% below the 30-year average.

The yields were also the greatest with the earlier planting dates in both studies (Figures 2 and 4) except for the earliest maturing variety (Figure 4). Generally, there is a nega-

tive relationship between SDS and yield at each planting date (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.

The greatest benefit to early planting was with the SDS-tolerant MG 3.5 variety in the SDS Planting Date Study, showing a 0.48 bu/day yield increase for planting dates before late June. The SDS susceptible variety of similar maturity responded with 0.30 bu/day yield increase over the late June planting date. The greater severity of SDS at the earlier planting dates probably contributed to some of the difference between the varieties.

Based on two years' data from two experiments, it appears that SDS and yield are favored by earlier planting. It will be interesting to see in a year when the SDS is more severe whether the yield potential for early planting date is greatly reduced or if a yield benefit is still realized. 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.

These studies show that when choosing the more SDS-tolerant varieties and taking measures to reduce SDS, there is a very positive benefit for earlier planting dates of soybeans in the Kansas River Valley.

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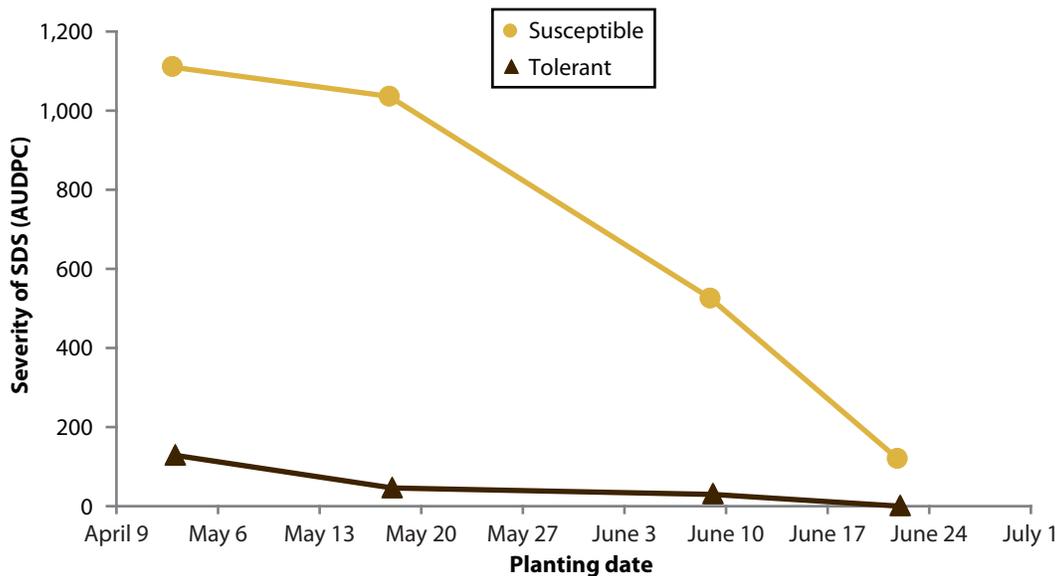


Figure 1. Effect of planting date for two soybean varieties on severity of sudden death syndrome (SDS) measured as area under disease progress curve (AUDPC), Kansas River Valley experiment fields, 2015 and 2016 averages.

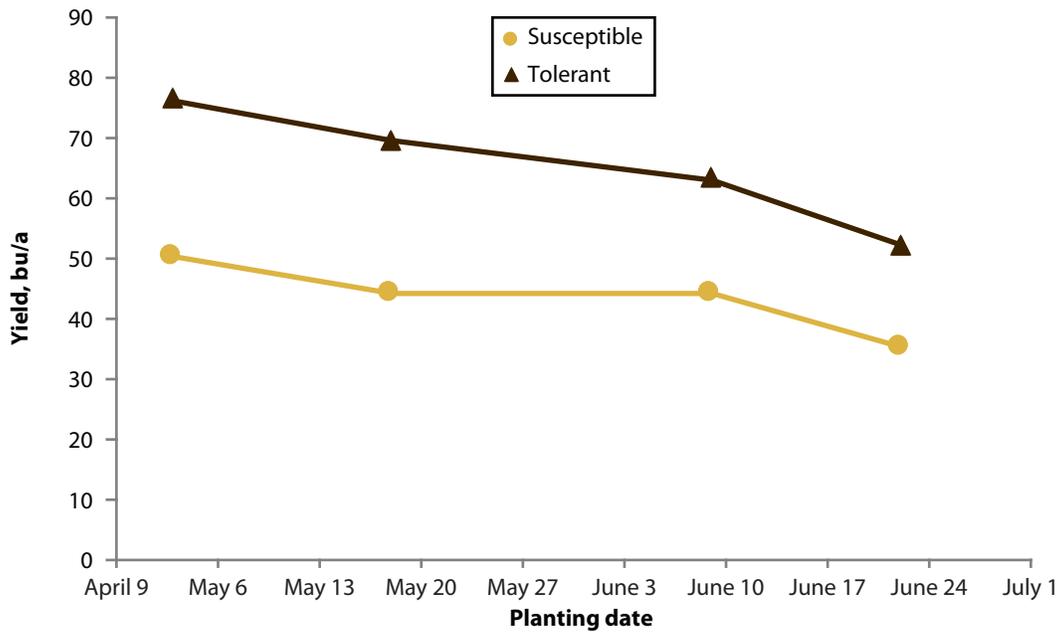


Figure 2. Effect of planting date on yield for two soybean varieties with different levels of susceptibility to sudden death syndrome (SDS), Kansas River Valley experiment fields, 2015 and 2016 averages.

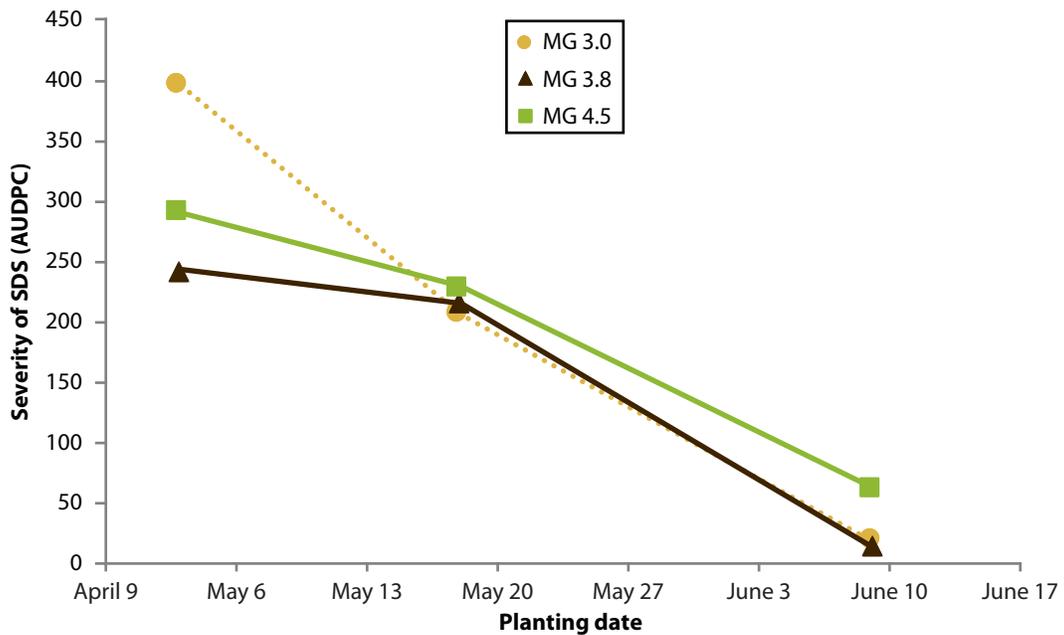


Figure 3. Effect of planting date on severity of sudden death syndrome (SDS) measured as area under disease progress curve (AUDPC) in soybean varieties of different maturity groups (MG) treated with ILeVO, Kansas River Valley experiment fields, 2015 and 2016 averages.

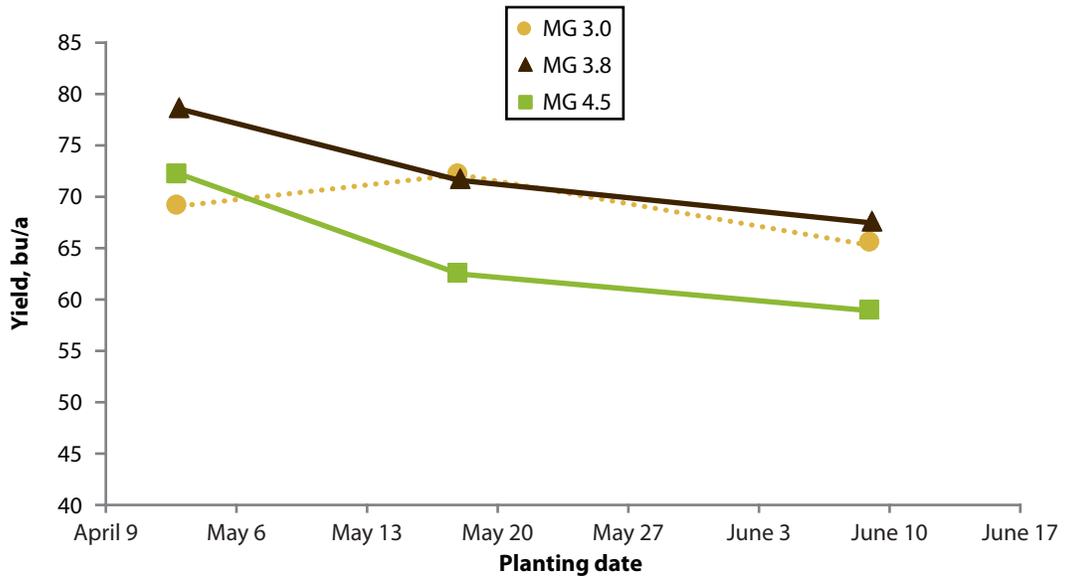


Figure 4. Effect of planting date on yield of soybean varieties of different maturity groups (MG), Kansas River Valley experiment fields, 2015 and 2016 averages.