Kansas Agricultural Experiment Station Research Reports

Volume 4
Issue 7 *Kansas Field Research*

Article 9

2018

Impact on Soybean Yield from Sudden Death Syndrome and Soybean Planting Date

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Recommended Citation

Adee, E. A.; Little, C.; and Ciampitti, I. A. (2018) "Impact on Soybean Yield from Sudden Death Syndrome and Soybean Planting Date," *Kansas Agricultural Experiment Station Research Reports*: Vol. 4: Iss. 7. https://doi.org/10.4148/2378-5977.7610

Impact on Soybean Yield from Sudden Death Syndrome and Soybean Planting Date

Funding Source

This research was funded in part by the Kansas Soybean Commission.

Impact on Soybean Yield from Sudden Death Syndrome and Soybean Planting Date

E.A. Adee, C. Little,[1] and I.A. Ciampitti

Summary

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. SDS tends to be most severe on well-managed soybeans with a high yield potential. It also tends to be more prevalent on fields that are infested with soybean cyst nematode (SCN) or planted early when soils are wet and cool. Historical yield losses from this disease are generally in the range of 1–25%.

Soybean planting dates have been moving increasingly earlier in much of the soybean growing region, including Kansas. Yield loss of up to 0.5 bushel per day is not uncommon when soybeans are planted after May 10 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 as a management practice to help avoid the cooler/wetter soils that can create greater probability of infection by the fungus.

Procedures

Planting Date Study

Two soybean planting date studies evaluating the severity of SDS and soybean yield were conducted at the Kansas River Valley experiment fields in Topeka from 2015-2017. One study was specifically looking at SDS by promoting infection (early and greater irrigation volume), and the other was targeting best management practices to minimize SDS. In the study promoting SDS, two soybean varieties of MG 3.5, one SDS susceptible and one SDS tolerant, were planted into fields with a history of SDS in 2015, 2016, and 2017, on average planting dates of May 3 and 20, and June 8 and 22. The soil was Eudora silt loam and the previous crop was corn. Both studies had foliar symptoms of SDS develop during the growing season. Foliar symptoms of SDS were rated weekly starting July 29, 2015, at R3 (beginning pods); August 8, 2016, at R4 (full-length pods); and August 25, 2017, at R5 (beginning seed); until R6 (full seed) for all planting dates. Ratings were based on incidence and severity of symptoms resulting in percent defoliation. Harvest was completed by October 13 for all three study years.

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Best Management Practice Study

Management practices to reduce or avoid SDS were implemented in this study. These include treating the seed with ILeVO (Bayer) at 35 mL/unit of seed to protect against SDS, and withholding irrigation until the crop was getting close to moisture stress (September 1, 2015, August 10, 2016, and July 16, 2017) with less than 3 inches each year. Three soybean varieties of differing maturity group (MG) were planted on three different dates. Soil type, rainfall, and herbicide programs were the same as with the SDS Planting Date Study. Also, SDS ratings and harvest were the same dates as the SDS Planting Date Study.

Results

The severity of SDS was greatest with the early planting dates in both studies (Figures 1 and 3), decreasing to very little SDS for the June planting dates with the varieties having average or below-average tolerance to SDS. Overall, SDS foliar symptoms developed later in 2016 and 2017 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.

The yields were also the greatest with the earlier planting dates in both studies (Figures 2 and 4) except for the susceptible variety (Figure 2). Generally, there is a negative 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 was partially realized with the more tolerant varieties despite the yield loss due to SDS.

The greatest benefit to early planting was with the SDS tolerant MG 3.5 variety in the SDS Planting Date Study, showing a 0.3 bushel per day yield increase for planting in early May versus mid-May. In the Best Management Practice Study, the MG 4.0 varieties averaged 0.33 bushels per day for the early May planting date versus mid-May. The tolerant varieties were able to realize some of the increased yield potential with the earlier planting. The SDS susceptible variety of similar maturity responded with essentially no yield increase when planted in early May versus early June. While the severity of SDS was greater at the earlier planting dates, the tolerant varieties were able to respond with increased yield, showing the importance of selecting varieties with better tolerance to SDS and incorporating other measures to reduce SDS.

Summary

Based on three years of data from two experiments, SDS is favored by earlier planting, as well as yield. 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 will still be realized. It could be that with more severe SDS, the yield response to earlier planting date may look more like that of a very susceptible variety (no change in yield unless planting date is very late).

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

Acknowledgment

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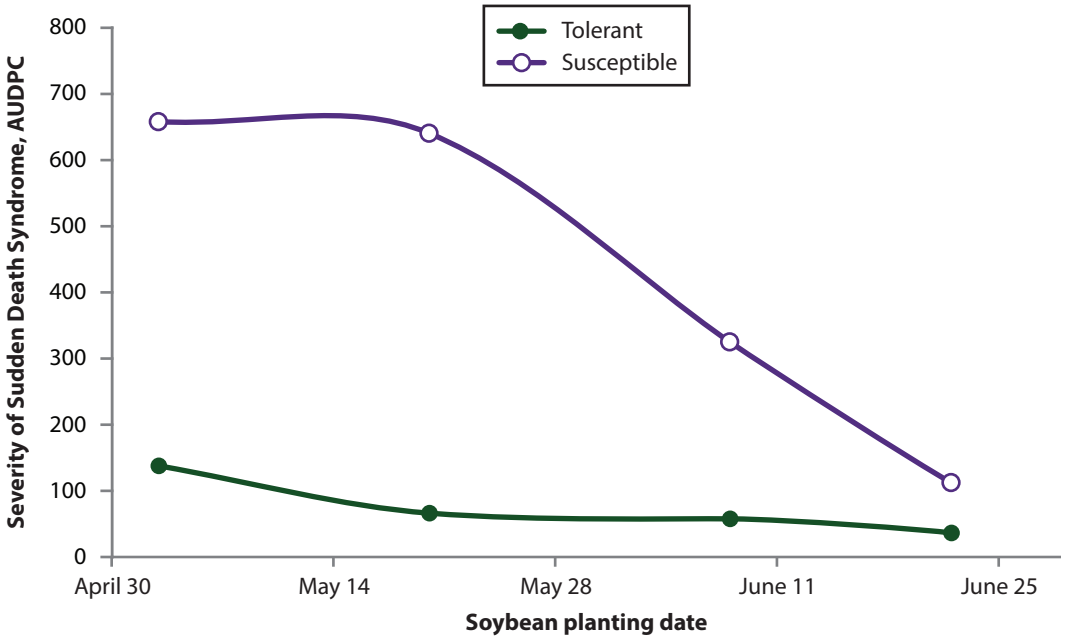

Figure 1. Effect of planting date for two soybean varieties on severity of sudden death syndrome (SDS) measured as area under disease progress curve (AUDPC), Kansas River Valley experiment fields, 2015, 2016, and 2017 averages.

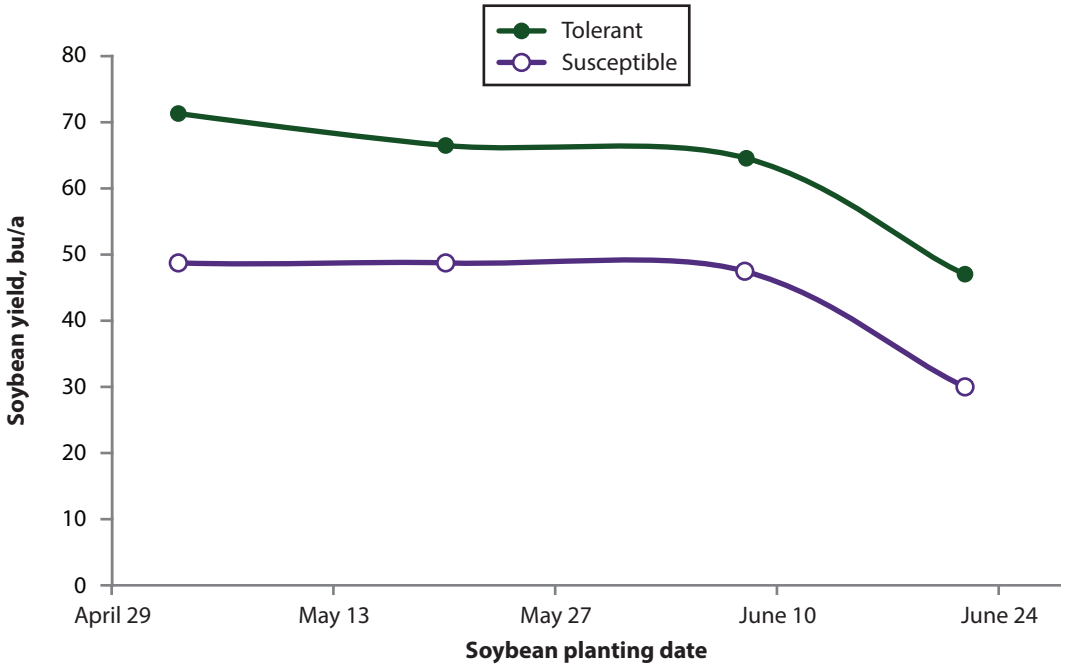

Figure 2. Effect of planting date on yield for two soybean varieties with different levels of susceptibility to sudden death syndrome (SDS), Kansas River Valley experiment fields, 2015, 2016, and 2017 averages.

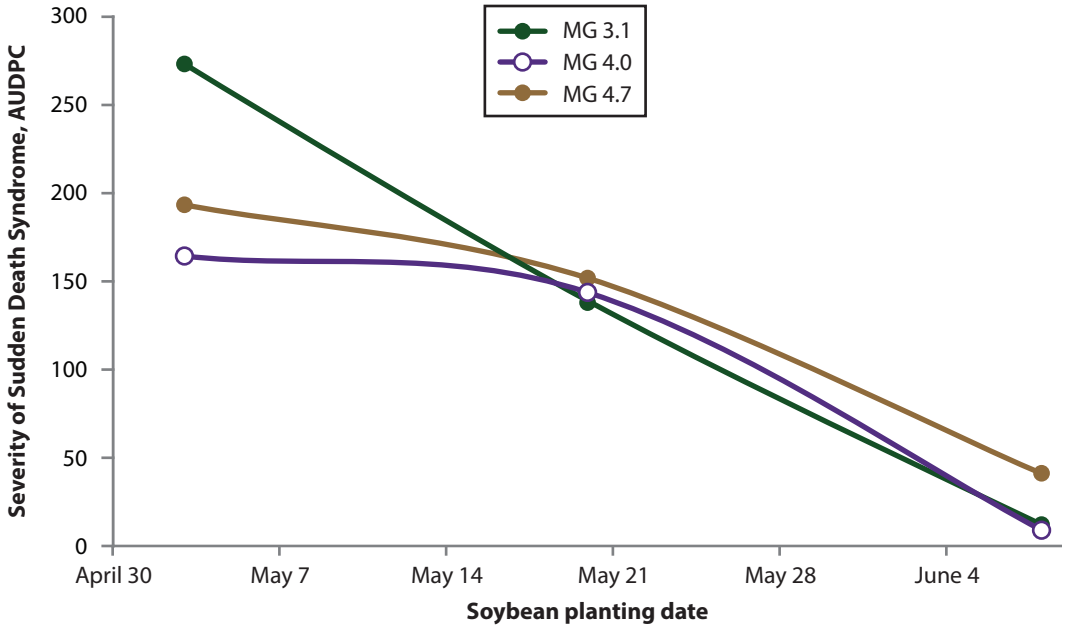

Figure 3. Effect of planting date on severity of sudden death syndrome (SDS) measured as area under disease progress curve (AUDPC) in soybean varieties of different maturity groups (MG) treated with ILeVO, Kansas River Valley experiment fields, 2015, 2016, and 2017 averages.

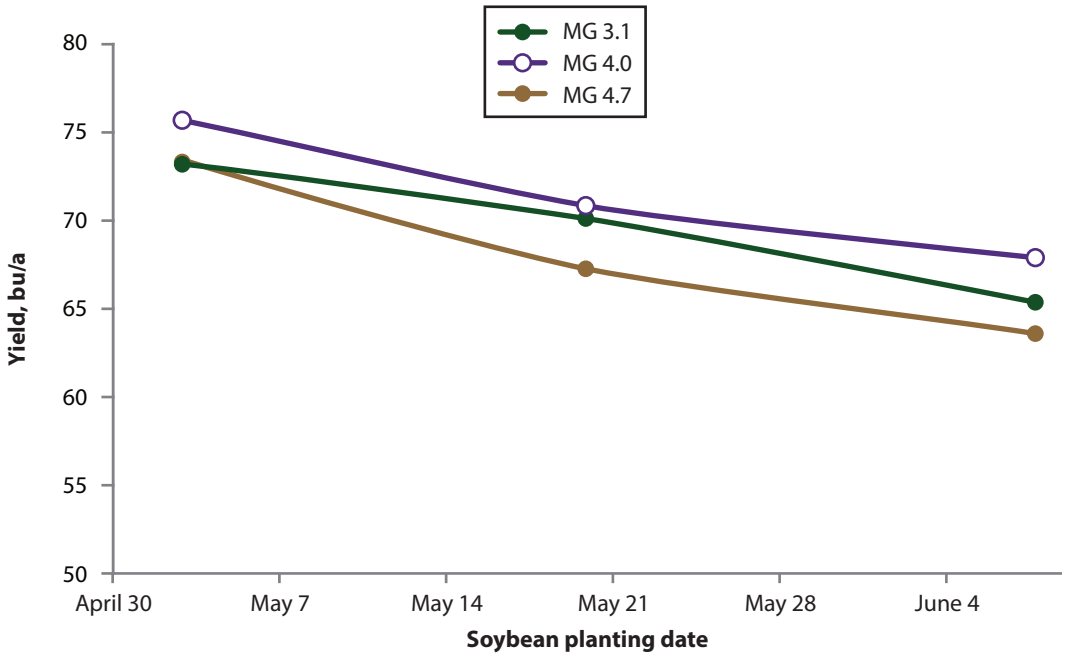

Figure 4. Effect of planting date on yield of soybean varieties of different maturity groups (MG), Kansas River Valley experiment fields, 2015, 2016, and 2017 averages.

Figure 5. Sudden death syndrome.