Evaluating Grain Sorghum Hybrids for Sugarcane Aphid Resistance: North Texas, 2017

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Summary. A replicated field study was conducted in Hunt County (north Texas) to evaluate resistance to sugarcane aphid SCA in 10 sorghum hybrids considered to have some resistance to sugarcane aphid and one hybrid known to be susceptible. The mean number of SCA in SP 73B12, SP 7715, SP 78M30, BH 4100, Golden Acres 3960B, Warner W-7051, and Warner W-844E remained below the treatment threshold (50 aphids/leaf) throughout the season and exhibited no leaf damage due to sugarcane aphid at grain maturity. Aphid densities in SP 68M57, Warner W-625Y and Pioneer 83P56 were also very low but increased slightly to 60 aphids per leaf late in the season. There was no yield benefit in applying an insecticide for sugarcane aphid in these ten hybrids. In contrast, the susceptible check averaged 600 SCA/leaf, exhibited 35% leaf damage, and yielded significantly less (49%) when no insecticide was applied to control sugarcane aphid. The results of this study indicate that these 10 hybrids have some resistance to sugarcane aphid.

Objective. The objective of this study was to identify resistance or tolerance to sugarcane aphid in commercial grain sorghum hybrids thought have some resistance as determined by seed companies.

Methods and Materials. The ten commercial hybrids evaluated were: SP 73B12 (Sorghum Partners), SP 7715 (Sorghum Partners), SP 68M57 (Sorghum Partners), SP 78M30 (Sorghum Partners), BH 4100 (B&H Genetics), Golden Acres 3960B, Warner W-7051, Warner W-625Y, Warner W-844E, and Pioneer 83P56. DeKalb 53-67 was included as a known susceptible. The entire study area was surrounded by 6 rows of DKS 53-67. The study was planted at the Texas A&M Commerce farm near Greenville, Texas on May 16, 2017. The test was planted late to increase the likelihood that a high sugarcane aphid population would develop in the test field. Plots were eight rows wide and 30 feet long with 30-inch row spacing. Each hybrid was planted to four plots (replications) in a randomized complete block design. Each plot was divided into two subplots of four rows each. The center two rows of one subplot were treated with insecticide to control sugarcane aphids while the second subplot was not treated. The experimental design was a factorial with hybrid as the main plot and insecticide treated or untreated as the subplot. This allowed a direct comparison of yield with and without sugarcane aphid control for each hybrid.

Sugarcane aphid infestations were sampled by estimating the number of aphids per leaf on one bottom leaf and one upper leaf on 5 plants in each of the center two rows of each subplot, for a total of 10 plants (20 leaves) per plot. The bottom leaf was the lowest leaf which was 90% green. The upper leaf was the top leaf but once the flag leaf was present, the upper leaf was the leaf below the flag leaf. Aphids were sampled on July 3 and July 11. On July 11, aphid densities on some plants in the susceptible hybrid exceeded the treatment threshold of 50 aphids per leaf. As a result, Sivanto insecticide was applied to the insecticide subplots at a rate of 7 oz/acre in 13 gallons of water/acre on July 13 using a backpack sprayer. The use of TII spray nozzles and the two untreated border rows on each side of the

treated plot served to reduce spray drift into the untreated subplot. On the same date, the entire study area was treated with Sevin XLR Plus at a rate of 1 quart per acre to reduce densities of predatory insects feeding on sugarcane aphids. Aphid densities were counted again on July 25 (12 days after treatment) and on August 1 and August 29. Leaf damage due to sugarcane aphid feeding was assessed on August 29 (soft dough stage) using a scale of 1-9 with 1= no damage, 2=1-5%, 3= 6-20%, 4= 21-35%, 5=36-50%, 6=51-65%, 7=66-80%, 8=81-95%, 9=96-100%. The middle two rows of each subplot were machine harvested on September 13 and grain weights were adjusted to 14.5% moisture. Differences in yield within each hybrid treated and not treated for sugarcane aphid were analyzed using the MIXED Procedure of SAS at α= 0.05.

Results. Sugarcane aphids were first detected on July 3 during the preboot stage. Heavy rains occurred July 4 and July 11. Lady beetles and other aphid predators were common but numbers were greatly reduced following the application of Sevin insecticide on July 13. Aphid densities in the Sivanto treated subplots on July 25, 12 days after treatment, were very low (0-3 aphids/leaf) and remained at this level throughout the season. In the untreated susceptible hybrid, sugarcane densities were very high on August 1, averaging 600 per leaf (Fig. 1). However, average aphid densities in all other hybrids were less than the treatment threshold of 50 aphids per leaf (Fig. 2). Grain development was in the milk to soft dough stage of development at this time. Frequent and heavy rains occurred during August. Sugarcane aphid numbers in the susceptible check were very low August 29. Although aphid densities in the other hybrids increased during August, mean densities in all but three hybrids remained below 50 aphids per leaf on August 29 (Fig. 2). Mean aphid densities averaged about 60 aphids per leaf in SP 68M57, Pioneer 83P56 and Warner-625Y. However, grain was in the hard dough stage, honeydew was not common, and aphids were not infesting the heads in these hybrids, suggesting that an insecticide treatment was not warranted given these conditions.

Average leaf damage in the susceptible check was 35% on August 29 (Fig. 3). Five percent leaf damage was observed in Pioneer 83P56 and in SP 68M57, which corresponded to the slightly higher aphid densities in these two hybrids. No leaf damage was observed in Warner-625Y or the remaining hybrids.

In the susceptible hybrid, mean grain yield was 49% less where an insecticide was not applied for sugarcane aphid relative to the insecticide treated and susceptible hybrid. This difference was statistically significant ($p = 0.0063$) (Fig. 4). Mean yield of the insecticide treated and not treated subplots within each hybrid was not significantly different for all other hybrids.

Conclusions. The known susceptible hybrid averaged 600 sugarcane aphids per leaf and 35% leaf damage, demonstrating that sugarcane aphid pressure was very high in this trial. However, aphid densities and leaf damage were much lower in the ten presumed resistant varieties. Also, there was no yield loss when these hybrids were not treated with insecticide for sugarcane aphid. These results support the conclusion that all ten hybrids have some resistance to sugarcane aphid. However, these hybrids are not immune and must be scouted and, if sugarcane aphid infestations exceed the threshold, should be treated with an insecticide to avoid crop loss.

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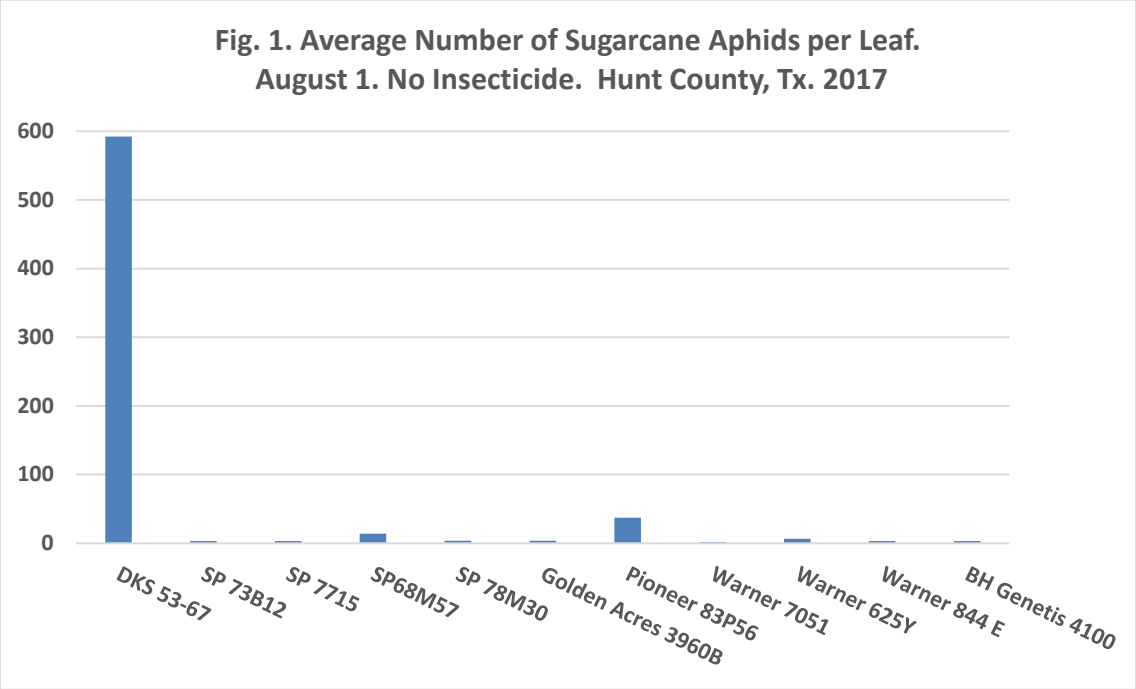

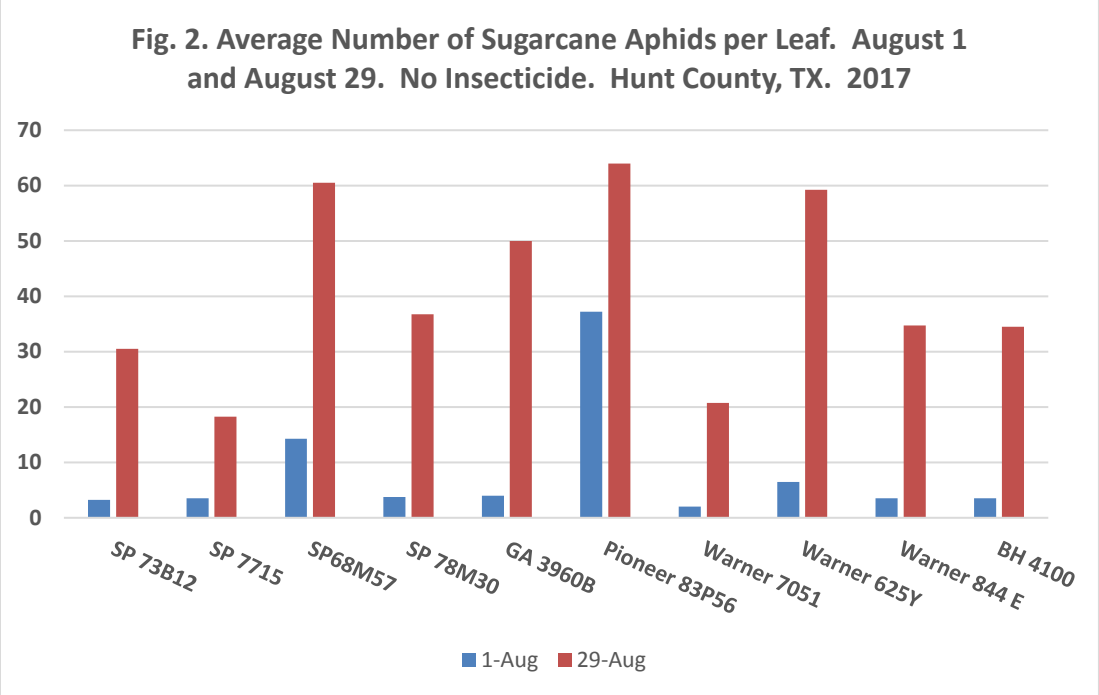

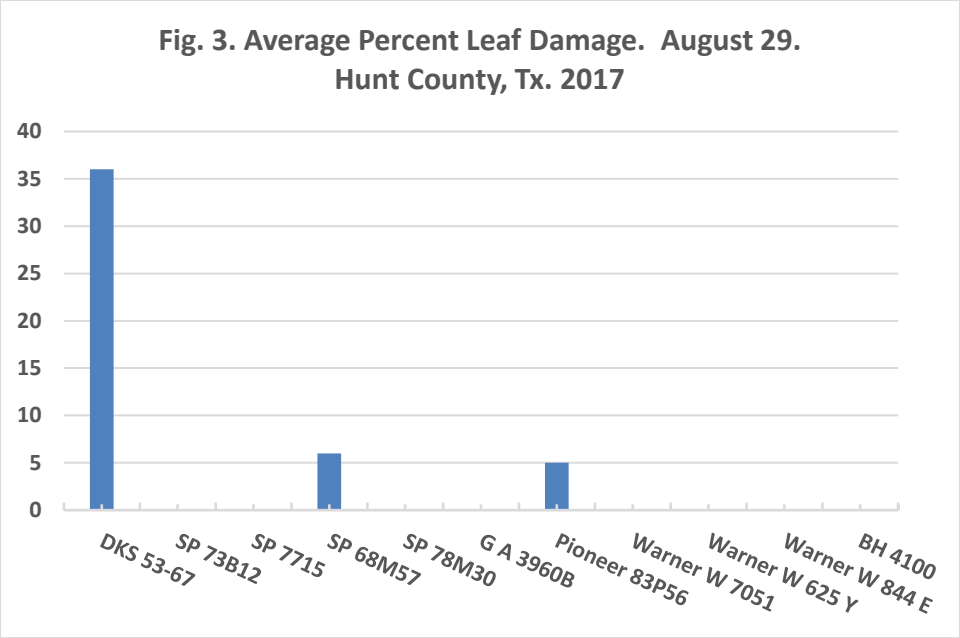

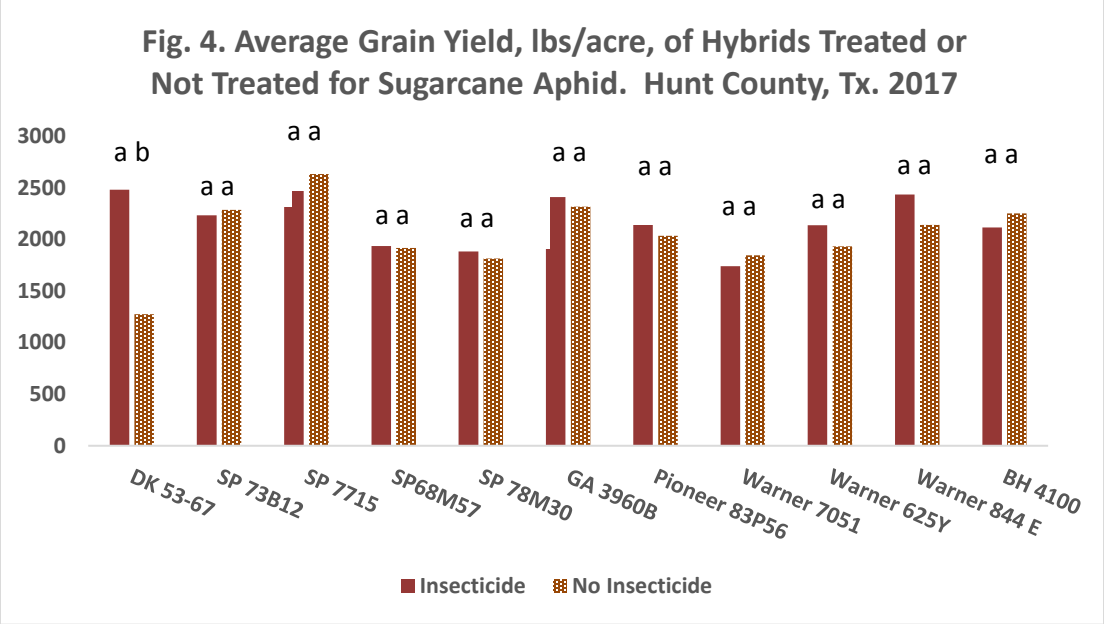

Note: Mean yields denoted with different letters indicated yield of insecticide treated and untreated plots within the same hybrid are significantly different. This was true only for the suscpetible entry DKS 53-57.