Small Plot Evaluation of Sugarcane Aphid Tolerance in Sorghum

Texas A&M AgriLife Extension Service
Nueces County, 2016

Cooperator: Jim Massey

Authors: Jason Ott and Robert Bowling

Summary

A growing number of company-designated sugarcane aphid (SCA)-tolerant sorghum hybrids are reaching the market. Sorghum producers may be hesitant to use SCA-tolerant sorghum because published research is lacking that documents SCA tolerance and product performance. The current demonstration attempts to document the value of commercial sorghum hybrids designated as 'Highly Tolerant' to SCA in limiting aphid growth and protecting yield potential in these hybrids. The current demonstration evaluates 15 hybrids for tolerance to SCA in a production field near Robstown, TX. Results of small plot evaluations showed sorghum hybrids SP7715, BH4100, AG1203, GX15484, and M60GB31 (Fig. 1A) had the fewest number of SCA supporting company designations of these hybrids as highly SCA tolerant.

Introduction

A growing number of company designated sugarcane aphid (SCA) tolerant sorghum hybrids are reaching the market. These products may offer sorghum producers a cost-effective strategy to manage SCA in-lieu of insecticides. SCA tolerant sorghum complements other IPM strategies such as cultural control and biological control. Insecticides can be used with tolerant sorghum hybrids if SCA populations reach economic populations. Sorghum producers may be hesitant to use SCA tolerant sorghum because published research is lacking to document SCA tolerance and product performance. The objective of this demonstration was to document the value of commercial sorghum hybrids designated as 'Highly Tolerant' to SCA in limiting aphid growth and protecting yield potential in these hybrids.

Materials and Methods

Seeds of 15 hybrids from five commercial seed companies were provided for this demonstration (Table 1). Seed was treated with Concept III, a fungicide, and an insecticide seed treatment. The demonstration was planted on February 20, 2016 in a commercial sorghum production field near Robstown, TX. The previous crop was sorghum and the field, a Victoria clay, was fertilized with 400 lbs. of 25-5-0, and Outlook® (BASF) herbicide at 12.5 oz. was applied to manage weeds. Each hybrid was planted at a rate of 44,000 seeds per acre in 8-30 in. x 120' long rows. Hybrids that had a clumped distribution of SCA were split into two small plot locations where one plot was aphid free and the other plots had large aphid populations. Hybrid assessments included SCA populations, leaf damage ratings (Table 2), test weight, and yield. Thirty consecutive plants from the second row of each plot were evaluated for SCA leaf injury. The percentage yield reduction and monetary loss was determined by comparing performance in aphid free and aphid infested plots.

Results

Sorghum hybrids SP7715, BH4100, AG1203, GX15484, and M60GB31 (Table 3) had the fewest number of SCA which supports company designations of these hybrids as 'Highly Tolerant' to SCA. Conversely, SP70B17, SP68M57, GX16667, M77GB52, and M75GB47 appeared to be susceptible based on SCA populations and plant injury observed in this demonstration (Table 3). Other entries showed moderate to and high tolerance to SCA (Table 3). Numerical differences in yield and test weight were observed among the hybrid entries, but it was not possible to determine if differences were, in part, from SCA or inherent for each hybrid (Table 3). The exceptions were susceptible hybrids in small plots infested with large populations of SCA that caused substantial injury to plants. SCA-induced damage reduced yields by 12% or more and potential income reductions by $30.00/acre or more (Tables 3 and 4).

Discussion

SCA tolerance by sorghum hybrids SP7715, BH4100, and AG1203 were consistent with several replicated trials in south and north central TX. Hybrids designated as having moderate to high SCA tolerance was based on comparisons of SCA populations on all hybrids in this demonstration. These hybrids could certainly be characterized as 'Highly Tolerant' to SCA due to the low number of aphids through the assessment time.

There were differences in SCA-induced plant injury among hybrids in this demonstration. Susceptible hybrids in small plots infested with large SCA populations resulted in moderate to severe leaf injury. Yield from these plots was reduced by 12 to 22% when compared with adjacent plots not infested with SCA (Table 4). Yield loss associated with SCA damage reduced income be approximately 30.00 to 45.00 dollars per acre depending on hybrid and the amount of plant damage (Table 4). Highly tolerant sorghum hybrids in this trial had small to no SCA and no visible injury by SCA (Table 3).

In this demonstration, 'Highly Tolerant' sorghum hybrids protected yield potential from damaging populations of SCA. The traits expressed by these hybrids prevented development of economic SCA populations thereby eliminating the need for and insecticide application ($12.00 to $18.00/a or more) and prevented economic injury observed in the susceptible hybrids ($30.00 to $45.00/a). These hybrids will offer producers an option to insecticides for SCA management in their sorghum.

ACKNOWLEDGEMENTS

The cooperation and support of Jim Massey, IV for implementing and managing this trial is appreciated. We thank Sorghum Partners, B&H Genetics, Dyna-Gro, Terral, and Alta for providing seed used in this demonstration. In addition, special thanks to J.R. Cantu, Daisy Castillo, Chris Cernosek, and Cord Willms for assisting with data collection.

Table 1: Sorghum hybrids used in this demonstration and associated companys supplying seed

Variety	Company
SP68M57	
SP70B17	Sorghum Partners
SP7715	
DG GX 16667	
DG M75GB47	
DG GX 15484	
DG GX 15371	dyna-Gro
DG M77GB52	
DG 766B	
DG M 60GB31	
RV 9562	
RV 9924	Terral
RV 9782	
BH 4100	B&H Genetics
AG 1203	Alta

Table 2: SCA leaf injury rating and corresponding description of injury.

Plant Injury Rating Number	Description of Leaf Injury
1	No apparent damage
2	Up to 10% of the foliage with signs of sugarcane aphid activity or injury including honeydew, sooty mold, and leaf spotting
3	Up to 10% of the foliage with signs of sugarcane aphid activity or injury including honeydew, sooty mold, and leaf spotting
4	From 21 to 40% of the foliage with signs of sugarcane aphid activity or injury
5	From 41 to 50% of the foliage with signs of sugarcane aphid activity or injury including honeydew, sooty mold, and leaf spotting
6	From 51 to 60% of the foliage with signs of sugarcane aphid activity or injury
7	From 61 to 70% of the foliage with signs of sugarcane aphid activity or injury including honeydew, sooty mold, and leaf spotting
8	From 71 to 80% of the foliage with signs of sugarcane aphid activity or injury including honeydew, sooty mold, and leaf spotting
9	From 81 to 90% of the foliage with signs of sugarcane aphid activity or injury
10	Greater than 90% of the foliage with signs of sugarcane aphid activity or injury

Table 3: In-field assessments of sorghum hybrids to SCA infestations in Banquete, TX (2016).

Response to SCA	Hybrid	Plant Injury Rating*	Test Wt. (lbs/a)	Yield
	SP68M57§	7	57	3486
	SP68M57	1	55	4486
	DG GX 16667	1	51	3495
	DG GX 16667§	4	52	3038
Susceptible	DG M 77GB52	4	53	3249
	DG M 75GB47	1	54	4449
	DG M 75GB47§	6	56	3909
	SP70B17	1	55	4478
	SP70B17§	6	57	3575
	DG CX 15371	1	55	4026
	DG 766B	1	56	4545
Moderate to	RV 9562	1	57	4422
Highly Tolerant	RV9924	1	57	5184
	RV9782	1	56	5259
	RV9782	2	55	4587
	SP7715	1	58	3606
	BH4100	1	51	3775
Highly Tolerant	AG1203	1	54	3125
	DG GX 15484	1	55	4380
	DG M 60GB31	1	56	3632

Table 2: In-field assessments of yield reduction associated with SCA damage to sorghum (Banquete, TX 2016).

Hybrid	Yield	Yield Reduction by SCA Damage (%)	Economic Loss (dollars/a)*
SP68M57	4486	22	44.50
SP68M57	3486		
DG GX16667	3495	13	29.49
DG GX16667	3038		
DG M75GB47	4449	12	35.22
DG M 75GB47	3909		
SP70B17	4478	20	38.89
SP70B17	3575		

*Based on sorghum market price of $6.45/cwt (Ag Market News Service, Amarillo, TX).

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Texas A&M AgriLife Extension Service
Nueces County, 2016

Cooperator: Jim Massey

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Summary

Since 2013, the sugarcane aphid (SCA), *Melanaphis sacchari* (Zehntner), has been a threat to sorghum production in south Texas. Host plant resistance is an IPM tactic that is complementary to other tactics including biological control and cultural practices with little to no additional costs to the farmer. Sorghum hybrids designated as 'Highly Tolerant' to sugarcane aphid are reaching the market with no published field data to support companies' claims. The current demonstration evaluates 15 hybrids for tolerance to SCA in a production field near Robstown, TX. Our results showed sorghum hybrids SP7715, BH4100, AG1203, GX15484, and M60GB31 (Fig. 1A) had the fewest number of SCA supporting company designations of these hybrids as highly SCA tolerant.

Introduction

Since 2013, the sugarcane aphid (SCA), *Melanaphis sacchari* (Zehntner), has been a threat to sorghum production in south Texas. Managing SCA on sorghum has primarily been through well timed insecticide applications. Although effective, insecticide applications add to production costs and lack of alternative management practices limits options for managing the aphid. Host plant resistance is an IPM tactic that is complementary to other tactics including biological control and cultural practices with little to no additional costs to the farmer. Sorghum hybrids designated as 'Highly Tolerant' to sugarcane aphid are reaching the market with no published field data to support companies claims. The current demonstration offers evidence of SCA tolerance in several sorghum hybrids.

Materials and Methods

Seeds of 15 hybrids from five commercial seed companies were provided for this demonstration (Table 1). Seed was treated with Concept III, a fungicide, and an insecticide seed treatment. The demonstration was planted on February 20, 2016 in a commercial sorghum production field near Robstown, TX. The previous crop was sorghum and the field, a Victoria clay, was fertilized with 400 lbs. of 25-5-0, and Outlook® (BASF) herbicide at 12.5 oz/A was applied to manage weeds. Each hybrid was planted at a rate of 44,000 seeds per acre in 8-30 in. x 2,897' long rows. Hybrid assessments included SCA populations, leaf damage ratings (Table 2), test weight, and yield. Sixty consecutive plants from each of two locations within each plot were evaluated for leaf damage.

Results

Sorghum hybrids SP7715, BH4100, AG1203, GX15484, and M60GB31 (Fig. 1A) had the fewest number of SCA which supports company designations of these hybrids as highly SCA tolerant. Conversely, SP68M57, GX16667, M77GB52, and M75GB47 appeared to be susceptible based on SCA populations observed in this demonstration (Fig 1C). Other entries in this demonstration showed moderate to and high tolerance to SCA (Fig 1B). SCA-induced plant damage was highest on sorghum hybrids designated as susceptible (Table 3). Numerical differences in yield and test weight were observed among the hybrid entries but it was not possible to determine if differences were, in part, from SCA or inherent for each hybrid (Table 3).

Discussion

SCA tolerance by sorghum hybrids SP7715, BH4100, and AG1203 were consistent with several replicated trials in south and north central TX. Hybrids designated as having moderate to high SCA tolerance was based on comparisons of SCA populations on all hybrids in this demonstration. These hybrids could certainly be characterized as 'Highly Tolerant' to SCA due to the low number of aphids through the assessment time.

There were differences in SCA-induced plant injury among hybrids in this demonstration. The low injury scores in susceptible sorghum suggests SCA were clumped and the overall impact of SCA on production was minimal. The clumped pattern is common for SCA on sorghum. However, highly tolerant sorghum hybrids in this trial reduced populations and no visible injury by SCA was observed. All hybrids had good to excellent yield so it is not likely that SCA had a significant impact on performance in this demonstration. However, this demonstration showed the benefit of hybrids with SCA tolerance by limiting aphid populations when compared with susceptible sorghum entries.

ACKNOWLEDGEMENTS

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Table 3: Sorghum hybrid performance including agronomic and SCA evaluations.

Response to SCA*	Variety	Plant Pop. (Plts/a)	Date of 50% Flower	Days to 50% Flower	Damage Rating#	Test Weight (bu/a)	Yield/Ac @14% (lbs/a)
Susceptible	SP68M57	46461	10-May	80	1.0	60.7	5441
	DG GX16667	41624	13-May	83	1.0	60.2	4555
	DG M75GB17	45496	5-May	75	1.7	59.0	4853
Moderately to Highly Tolerant	SP70B17	43560	9-May	79	1.0	59.9	5131
	DG GX15371	37752	9-May	79	3.2	62.6	5262
	DG M77GB52	42592	3-May	73	1.8	59.6	4816
	DG 766B	30008	5-May	75	1.0	60.3	4927
	RV9562	41624	5-May	75	3.5	60.9	5426
	RV9924	40656	6-May	76	1.0	60.8	5708
	RV9782	38720	4-May	74	1.0	60.9	5573
Highly Tolerant	SP7715	39688	9-May	79	1.2	60.9	5326
	BH4100	49368	9-May	79	1.0	61.5	5460
	AG1203	40656	11-May	81	1.0	61.4	5510
	DG GX15181	43560	12-May	82	1.0	61.3	5158
	DG M60GB31	38720	5-May	75	2.0	61.8	5332

*Response was based on the number of SCA observed on select plants counted over 6 consecutive weeks.
#Damage rating is on a 1-10 scale with a 1 representing no damage and a 9 representing a >90% of the foliage with signs of SCA activity or injury.

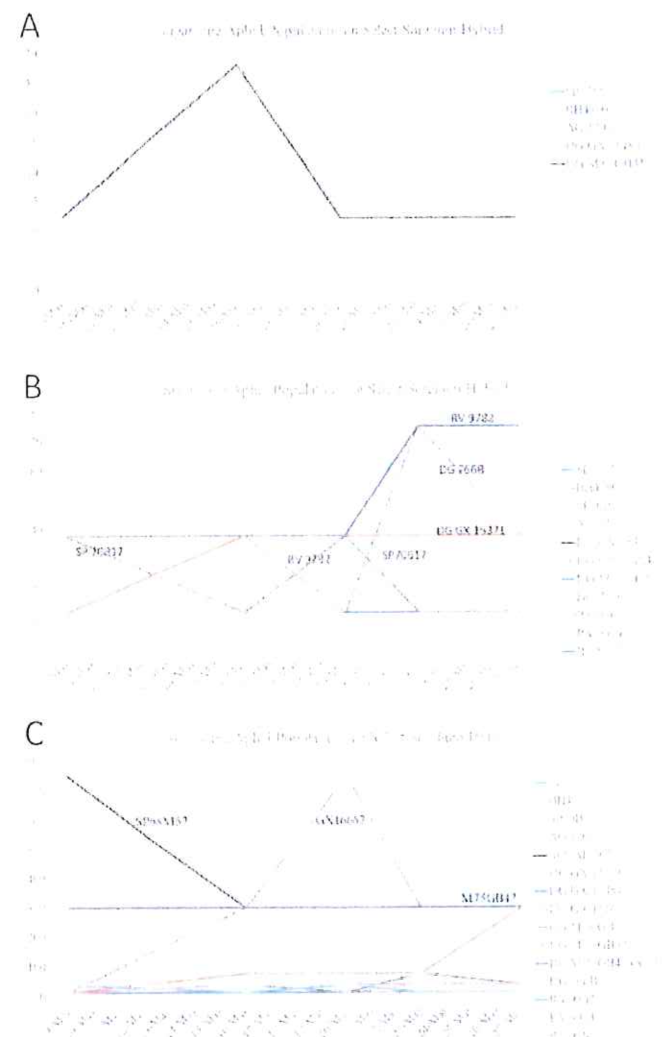

Fig 1: Hybrid response to SCA population growth in relation to tolerance and susceptibility.

Trade names of commercial products used in this report is included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by Texas AgriLife Extension Service and the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Jim Wells County Turn Row Meeting
May 16, 2017
Adams Farm

*It is easier to believe and accept what we can see and fell than what we are told.

*Please take advantage of this opportunity to look at the difference in sugarcane activity among these hybrids

Hybrid	Designation to Sugarcane Aphid	Number of Sugarcane Aphids per Leaf	
		16-May-17	26-May-17
DKS 53-67	Susceptible	185	350
DKS 48-07	Highly Tolerant	8	17
DKS 37-07	Highly Tolerant	11	33
SP68M57	Moderately Tolerant	84	69
SP 73B12	Highly Tolerant	6	1
SP 7715	Highly Tolerant	4	3

*Keep in mind that the economic threshold for sugarcane aphid on sorghum is 50 to 125 sugarcane aphids per leaf. The moderately tolerant and susceptible hybrids have exceeded the threshold.

As you walk into the field things to note:
*Honeydew accumulation on the leaves or absence thereof
*Leaf injury caused by sugarcane aphid or lack thereof
*Sugarcane aphid populations

When scouting for sugarcane aphid on sorghum some things to remember:
*check the underside of the top and bottom leaf
*always check the field edges! North, South, East and West. Some observations from last week:
> Sorghum field on McKenzie in CC had an average of 195 aphids per leaf and 50 sugarcane aphids per leaf inside the field!
> I found numerous examples of this last week.

Hybrid	SCA Damage Rating (1-9)
Dekalb	
DKS 47-07	3
DKS 37-07	4
DKS 33-07	4
DKS 53-67	7
DKS 53-67	7
DKS 53-53	8
DKS 51-01	8
DKS 38-16	8
DKS 45-23	8
Alta	
AG 2115	7
Golden Acres	
GA3960B	3
GA 3960B	4
GA 4980B	7
GA3970R	7
GA 5556	8
GA 5613	8
Sorghum Partners	
SP 73B12	1
SP 7715	1
SP78M30	1
SP 73B12	1
SP 68M57	6
SP 70-B17	9

2016 Hybrid Evaluations for Resistance to the SCA
Corpus Christi, Texas
January 18, 2017

Robert Bowling, John Gordy, Michael Brewer, Allen Knutson, Xandra Morris, Danielle Sekula, Stephen Biles, and David Olsovsky

Summary

On October 6, 2016 a field trial was planted at the Texas A&M Agrilife Research and Extension Center (Corpus Christi) to evaluate tolerance (resistance) in eight sorghum hybrids designated as "highly tolerant" to sugarcane aphid (SCA) when compared with two SCA susceptible hybrids. Each plot was divided into two subplots of four rows each. The center two rows of one subplot were treated with insecticide to control SCAs while the second subplot was not treated. On November 21 SCA populations were near the ET on the two SCA susceptible hybrids and sub-plots designated as 'sprayed' were treated with Sivanto (4 oz/a). SCA were present on sorghum "highly tolerant" to SCA but these populations were well below the ET. Aphid populations on SCA susceptible hybrids continued to increase to large numbers whereas only small population or no SCA were observed on "highly tolerant' hybrids not treated with an insecticide. SCA populations were very low to undetectable on all hybrids treated with Sivanto. SCA induced plant damage was highest and head emergence lowest on the susceptible hybrids not treated with an insecticide but plant damage was low to undetectable and normal head emergence in all "highly tolerant" hybrids. SCA induced feeding injury was not detectable on any of the hybrids when treated with Sivanto. Results of this trial support seed company designations of SCA tolerance. Results of the study also demonstrate the value of a well-timed insecticide application on protect sorghum from damage by SCA.

Introduction`

Sugarcane aphid (SCA) management on sorghum has been primarily through economic thresholds and insecticide applications. A few commercial hybrids designated as resistant or 'highly-tolerant' have been used to minimize damage caused by SCA.

Commercial sorghum hybrids resistant to SCA continue to reach the market with little confirmation of resistance from academia. Research and extension entomologist in the United States have established sorghum screening trials to verify SCA resistance previously reported by various seed companies.

Objective: The objectives of this study were to 1) determine tolerance (resistance) in select commercial sorghum hybrids designated by seed companies as "highly tolerant" to SCA and 2) determine hybrid response to SCA in an "aphid-free" (with insecticide treatment) environment compared to the same set of hybrids not treated with an insecticide.

Material and Methods: On October 6, 2016 an SCA trial was planted at the Texas A&M Agrilife Research and Extension Center (Corpus Christi) to evaluate tolerance (resistance) in eight sorghum hybrids designated by seed companies as "highly tolerant" to sugarcane aphid (SCA). Tolerant sorghum entries included SP73B12, SP78M30, SP7715 (Sorghum Partners), BH4100 (B&H Genetics), W7051 (Warner), and DKS37-07 and DKS48-07 (Monsanto). Two SCA susceptible hybrids, DKS38-88 and DKS53-67 (Monsanto), also were included in this trial. All hybrids had Concep III (Syngenta) and fungicide seed treatments. Roundup WeatherMAX® (Monsanto) was applied at 28 oz/a was applied prior to planting. On October 19 the trial was treated with iron to ameliorate iron chlorosis issues.

The trial was sown with a JD7100 4-row planter at a seeding rate equivalent to 52,500 seeds per acre with each plot measuring 8-38in. x 35 ft rows. 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 SCAs 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 head emergence with and without SCA control for each hybrid.

SCA 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 and 20 leaves sampled 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 November 21, December 13 and 28. Sivanto (Bayer) insecticide was applied at a rate of 4 oz/acre in 13 gallons of water/acre to the insecticide subplots on November 21 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. Leaf damage due to SCA feeding was assessed on December 21 using a scale of 1-9 with 1= no damage, 2=1-5%, 3=5-20%, 4= 21-35%, 5=36-50%, 6=51-65%, 7=66-80%, 8=81-95%, 9=95-100%. The number of plants and sorghum heads from rows 2 (not-treated) and 6 (insecticide treated) were counted in in each plot to determine percent head emergence. A freeze on January 6, 2017 killed the top growth and the experiment was terminated.

Results

SCA Assessments on Sorghum: Initial SCA counts were made on November 21, 2016 when sorghum growth ranged from V-8 to Boot-stage development. There were significant differences in SCA populations among hybrids ($F_{9,57}$=3.93; P=0.0120). The largest number of SCA occurred on the susceptible sorghum hybrids, DKS38-88 and DKS53-67. Plots designated as "aphid-free" were sprayed with Sivanto following these counts although the threshold of 50-125 aphids/leaf was not observed on any of the hybrids (Fig. 1). The insecticide treatment was based on SCA population growth and the time to the next counts in this trial. Each hybrid in the study was treated with an insecticide to normalize potential influences the insecticide may have on sorghum growth and development.

The second and third SCA assessments occurred on Dec. 13, 2016. Hybrid ($F_{9,38}$=5.04; P=0.0002) ($F_{9,38}$=26.38; P<0.0001) and insecticide ($F_{1,38}$=13.85; P=0.0006) ($F_{9,38}$=5.02; P=0.0002) treatments had a significant effect on SCA populations and there was a significant hybrid and spray treatments ($F_{9,38}$=5.02; P=0.0002) ($F_{9,18}$= 5.27; P<0.0001) interaction on December 13 and 21, respectively. Therefore, hybrid effect on SCA populations will be analyzed separately from spray treatments (no insecticide/insecticide applied) for each assessment date. SCA populations differed among hybrids when not treated with an insecticide ($F_{9,18}$= 5.02; P=0.0002) ($F_{9,18}$= 24.77; P<0.0001) but the effect did not occur when the hybrids were treated with an insecticide ($F_{9,18}$= 1.86; P=0.1262) ($F_{9,18}$= 1.26; P=0.3218) on December 13 and 21, respectively (Fig. 2 and 3).

Plant Damage: Hybrid ($F_{9,57}$=19.75; P<0.0001) and insecticide ($F_{1,57}$=48.79; P<0.0001) treatments had a significant effect on plant damage cause by SCA and there was a significant interaction between hybrid and spray treatments ($F_{9,57}$=13.94; P<0.0001). Therefore, hybrid effect on plant damage caused by SCA will be analyzed separately from spray treatments (no insecticide/insecticide applied). Hybrids designated as susceptible to SCA had significantly more SCA induced plant damage compared with sorghum hybrids designated by seed companies as "highly tolerant" to SCA in sub-plots not sprayed with an insecticide ($F_{9,27}$=25.76; P<0.0001) (Fig. 4). There was no statistical difference in plant damage among sorghum hybrids designated as "highly tolerant" to SCA. Statistical differences in plant damage among hybrids did not occur in sub-plots receiving an application of Sivanto ($F_{9,27}$=1.0; P<0.4635) (Fig 4).

Head Emergence: Hybrid ($F_{9,57}$=14.80; P<0.0001) and insecticide ($F_{1,57}$=23.49; P<0.0001) treatments had a significant effect on head emergence and there was a significant interaction between hybrid and spray treatments ($F_{9,57}$=11.90; P<0.0001). Therefore, hybrid effect on head emergence will be analyzed separately from spray treatments (no insecticide/insecticide applied). Hybrids designated as susceptible to SCA had significantly fewer heads compared with sorghum hybrids designated by seed companies as "highly tolerant" to SCA in sub-plots not sprayed with an insecticide ($F_{9,27}$=18.27; P<0.0001). There was no statistical difference in the number of heads among sorghum hybrids designated as "highly tolerant" to SCA. Statistical differences in head counts among hybrids did not occur in sub-plots receiving an application of Sivanto ($F_{9,27}$=0.81; P<0.6092) (Fig 5).

Conclusion

Sorghum hybrids designated by seed companies as "highly SCA tolerant" had fewer SCA during early vegetative growth through grain development when compared to sorghum susceptible to the aphid (Figs. 1, 2, and 3). The slow SCA population growth compared to susceptible hybrids suggests antibiosis as a resistance factor in hybrids designate as "highly tolerant" to SCA.

Sorghum hybrids "highly SCA tolerant" had little to no visible signs of plant injury by SCA whereas SCA susceptible sorghum hybrids were severely damaged when not treated with Sivanto (Fig. 4). The ability of SCA tolerant sorghums to limit SCA population growth and damage protects the yield potential of these hybrids. This potential was observed by head emergence among hybrids not treated with Sivanto (Fig. 5). Hybrids with SCA tolerance either maximized or were close to maximizing head emergence in this trial. SCA susceptible hybrids suffered extensive injury by SCA and a small percentage of plants exerted heads.

Resistance in "highly SCA tolerant" sorghum hybrids provide farmers an option for managing SCA on this farm. However, well timed application(s) of an insecticide can also protect hybrids from economically damaging populations of SCA (Figs. 1, 2, 3, and 4). In the absence of large populations of SCA following an insecticide application, SCA susceptible hybrids exerted more heads and had a greater potential to maximize yield.

The current research demonstrates the value of tolerance (resistance) in protecting plants from damage by SCA but also suggests that same level of protection can be achieved by scouting and timely insecticide application once SCA populations reach an economic threshold. Utilization of high yielding SCA susceptible hybrids protected by insecticides may be more profitable in a farm operation compared with yield limited products with 'tolerance' to the aphid. A sound management program will utilize multiple IPM tactics to protect sorghum from economically damaging populations of SCA while achieving production goals. However

It should be noted that all hybrids in this trial were infested by SCA. There is always a possibility that the most 'tolerant or 'resistant' hybrids may reach an economically damaging population of SCA. It is important that all sorghum fields are scouted for SCA to make a timely insecticide application.

Figure 1: November 21, 2016 SCA population estimates per sampled leaf on select sorghum hybrids designated as resistant or susceptible to SCA (Corpus Christi)

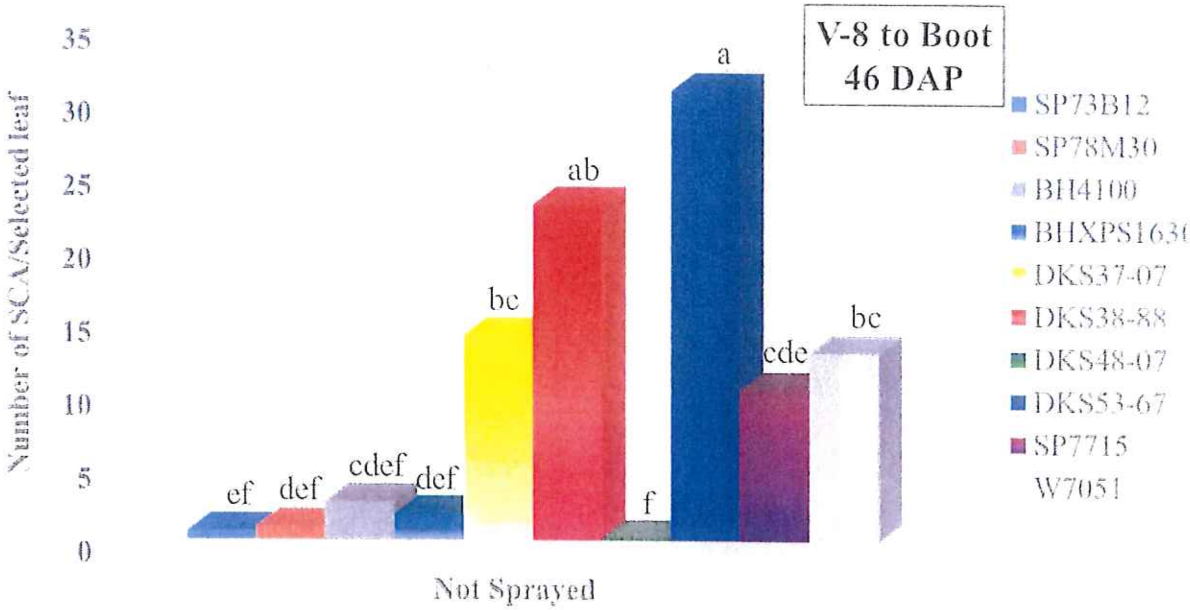

Figure 2: December 13, 2016 SCA population estimates per sampled leaf on select sorghum hybrids designated as resistant or susceptible to SCA (Corpus Christi)

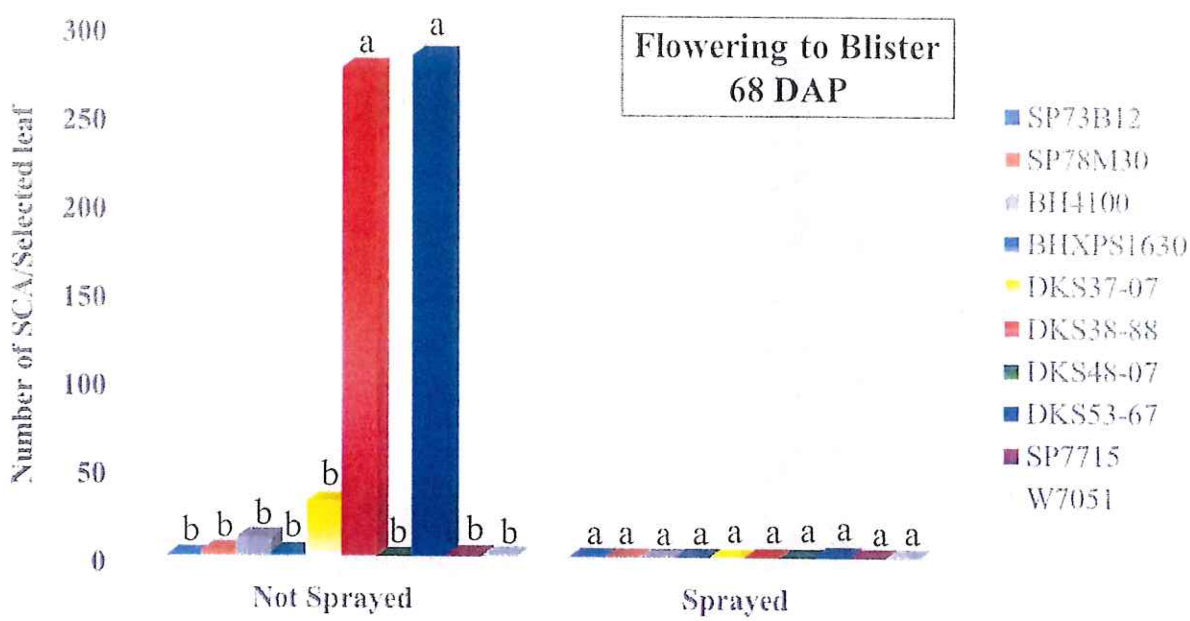

Figure 3: December 21, 2016 SCA population estimates per sampled leaf on select sorghum hybrids designated as resistant or susceptible to SCA (Corpus Christi)

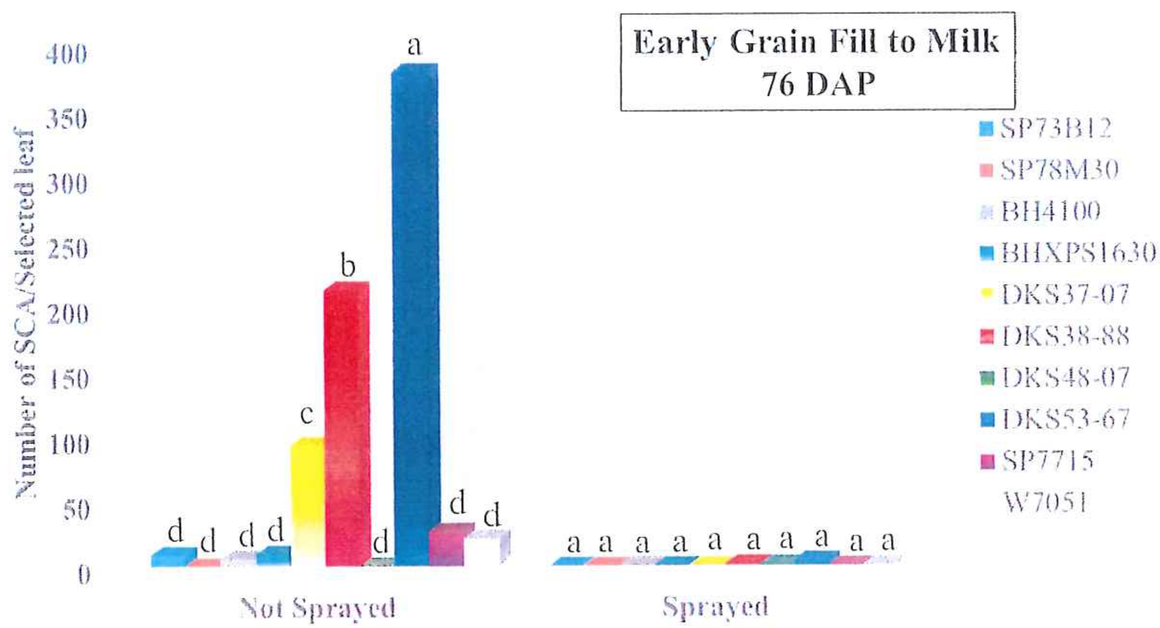

Figure 4: SCA Induced Plant Damage Ratings (Corpus Christi)

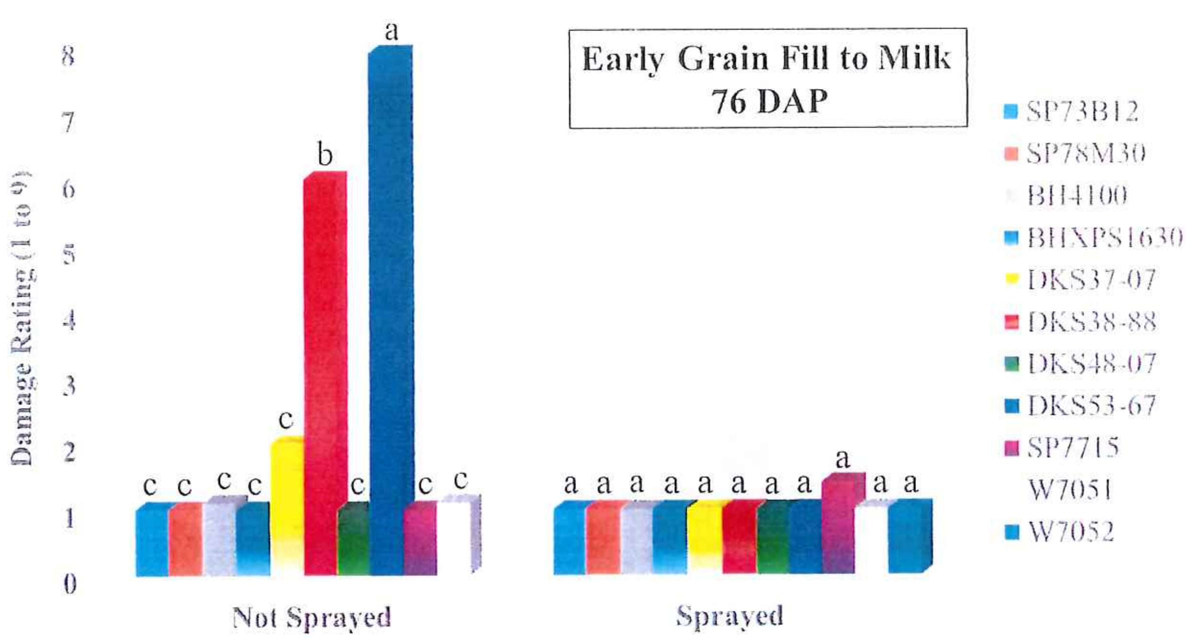

Figure 5: Sorghum Head Emergence for SCA Hybrid Resistance Screening Trial (Corpus Christi)