

Field Screening Sorghum Hybrids for Resistance to Sugarcane Aphid

Louisiana State University Agricultural Center

Objective: The objective of this study is to determine the yield benefit of treating sugarcane aphid resistant and/or tolerant grain sorghum hybrids for sugarcane aphids.

Materials and Methods

The field evaluation of hybrids was conducted using a split-plot design, with individual hybrids being the main plots while one sub-plot was kept free of aphid infestation by means of insecticide, Sivanto Prime (flupyradifurone) at 4.0 fl-oz/ac and the other sub-plot was left untreated. This was done to compare results among individual hybrids, and to see whether a hybrid benefitted from a spray in terms of aphid counts and yield.

Hybrids used included a known resistant hybrid DKS37-07, a known susceptible hybrid M75GB39, and 14 hybrids with suspected or unknown resistance (Table 1). These hybrids were planted at three locations, Alexandria (dryland), Winnsboro (irrigated) and St. Joseph, LA (dryland), and grown using standard cultural practices.

Aphids sample were taken weekly at the first sign of infestation. Each plot was visually assessed for severity of aphid infestation using a 0-6 scale, where 0 = no aphids, 1 =1-25 aphids, 2=26-50 aphids, 3=51-100 aphids, 4=101-500 aphids, 5=501-1000 aphids, 6= >1000 aphids. Plots designated for insecticide application were treated with a high clearance 4 row sprayer with TX6 hollow cone nozzles calibrated to deliver 10 GPA. Sugarcane aphids were treated in the appropriate plots on 11 and 12 July at the Alexandria and Winnsboro sites respectively. The St. Joseph location never had sufficient aphid pressure to justify treatment. Each test was protected from other pests as needed, namely sorghum midge and headworms. Yield values were taken by harvesting the middle two rows of each plot using a two row combine with an integrated scale. Moistures were recorded for each plot and adjusted to 14% moisture and are reported in bushels per acre.

Results

Aphid populations were greatest at the Alexandria location (Table 2). Due to logistical problems, the aphid population exceeded desired population densities prior to our ability to apply the insecticide to the sprayed plots. This is evident in the infestation rating on 11 July, particularly in the susceptible hybrid M77GB39 which rated approximately a 5 or 500-1000 aphids per leaf, both the sprayed and non-treated plots suffered severe yield loss. Because of the delay in a timely insecticide application, we were unable to measure a difference in yield between sprayed and non-sprayed plots for any hybrid. However, based on aphid densities over the evaluation period, we can confidently conclude which hybrids offer resistance to

sugarcane aphid. These hybrids included DKS37-07, 83P17, W844E, SP7715, 503x15, 504x15, 506x15, GX5371, GX15484, M71GR75, M73GR55 and M60GB31. The susceptible hybrids included M75GBB39, M77GB52, 765B and Rev9782. Rev9782 was identified as possibly possessing resistance based on ratings from sorghum OVT tests in 2015, but our data and observations from other tests suggests that this hybrid should not be considered resistant or tolerant.

Although the aphid population was lower at the Winnsboro site, results were identical to Alexandria. On 26 July when the aphid population was at its greatest, the same set of hybrids that appear resistant to sugarcane aphid. Aphid populations at the St Joseph location were too low to assess resistance.

Table 1. Hybrids evaluated

Hybrid	Origin
DKS 37-07	DeKalb/Monsanto
M75GB39	Dyna-Gro
83P17	Pioneer/DuPont
W844E	Warner
SP7715	Sorghum Partners
M77GB52	Dyna-Gro
765B	Dyna-Gro
Rev 9789	Terrell
503x15	Scott
504x15	Scott
506x15	Scott
GX15371	Dyna-Gro
GX15484	Dyna-Gro
M71GR75	Dyna-Gro
M73GR55	Dyna-Gro
M60GB31.0	Dyna-Gro

Table 2. Sugarcane aphid infestation ratings among various sorghum hybrids either sprayed with insecticide or non-treated and yields, Dean Lee Research Station – Alexandria, LA 2016.

Hybrid	Insecticide (Sivanto 4 fl-oz)	Infestation rating (0-6 scale) ¹				Yield (bu/ac)
		11 July	18 July	25 July	1 Aug	
DKS 3707	Sprayed	2.5 ef	1.5 de	1.3 de	1.3 cd	50.4 c-h
	Non-treated	2.0 e-h	1.3 ef	1.5 cde	1.3 cd	53.0 b-e
M75GB39	Sprayed	4.8 ab	1.0 ef	2.0 c	1.3 cd	9.4 l
	Non-treated	5.0 a	3.5 ab	4.5 a	2.5 ab	17.7 kl
83P17	Sprayed	2.8 de	1.0 ef	1.3 de	0.8 def	48.4 d-h
	Non-treated	2.3 efg	2.3 c	1.8 cd	1.3 cd	49.2 c-h
W844E	Sprayed	1.5 g-j	1.0 ef	1.0 e	0.8 def	42.6 e-i
	Non-treated	1.8 f-i	1.5 de	1.3 de	1.3 cd	48.1 d-h
SP7715	Sprayed	2.0 e-h	0.8 f	1.0 e	1.0 cde	51.8 c-f
	Non-treated	2.5 ef	1.3 ef	1.3 de	1.0 cde	48.1 d-h
M77GB52	Sprayed	3.5 cd	0.8 f	1.3 de	1.0 cde	37.4 e-j
	Non-treated	4.0 bc	3.3 b	3.3 b	2.5 ab	41.1 e-i
765B	Sprayed	4.8 ab	2.0 cd	2.0 c	1.3 cd	34.7 g-j
	Non-treated	4.5 ab	3.8 ab	3.5 b	1.8 bc	22.9 jkl
REV 9782	Sprayed	4.8 ab	1.0 ef	2.0 c	1.3 cd	31.2 ijk
	Non-treated	4.5 ab	4.0 a	4.3 a	3.3 a	36.2 f-j
Scott 503x15	Sprayed	1.0 ij	1.0 ef	1.0 e	0.0 f	68.2 ab
	Non-treated	1.0 ij	1.0 ef	1.0 e	0.3 ef	64.7 abc
Scott 504x15	Sprayed	1.3 hij	1.0 ef	1.0 e	0.8 def	77.5 a
	Non-treated	1.0 ij	1.3 ef	1.0 e	0.5 def	75.4 a
Scott 506x15	Sprayed	1.0 ij	1.0 ef	1.0 e	0.3 ef	74.0 a
	Non-treated	0.8 j	1.0 ef	1.0 e	0.5 def	64.3 a-d
GX15371	Sprayed	2.0 e-h	1.0 ef	1.0 e	1.0 cde	73.0 a
	Non-treated	1.3 hij	1.3 ef	1.0 e	0.3 ef	61.5 a-d
GX15484	Sprayed	1.3 hij	1.0 ef	1.0 e	0.5 def	52.8 b-e
	Non-treated	1.3 hij	1.0 ef	1.0 e	0.8 def	50.7 c-g
M71GR75	Sprayed	1.0 ij	1.0 ef	1.0 e	0.8 def	28.5 ijk
	Non-treated	0.8 j	1.0 ef	1.0 e	1.0 cde	34.4 hij
M73GR55	Sprayed	1.5 g-j	1.0 ef	1.0 e	0.5 def	42.6 e-i
	Non-treated	1.3 hij	1.0 ef	1.0 e	0.5 def	53.5 b-e
M60GB31	Sprayed	1.5 g-j	1.0 ef	1.0 e	0.0 f	43.4 e-i
	Non-treated	1.0 ij	1.0 ef	1.0 e	0.5 def	34.9 g-j

Means in a column followed by the same letter are not significantly different based on an F protected LSD (P < 0.05).

¹Infestation rating where 0 = no aphids, 1 = 1-25 aphids, 2 = 26-50 aphids, 3 = 51-100 aphids, 4 = 101-500 aphids, 5 = 501-1000 aphids, 6 = >1000 aphids.

Table 3. Sugarcane aphid infestation ratings among various sorghum hybrids either sprayed with insecticide or non-treated and yields, Macon Ridge Research Station, Winnsboro, LA 2016.

Hybrid	Insecticide (Sivanto 4 fl-oz)	Infestation rating (0-6 scale) ¹				Yield (bu/ac)
		12 July	19 July	26 July	2 Aug	
DKS 3707	Sprayed	1.3 cd	2.0 cde	0.8 f-i	0.8 c-f	92.6 a-f
	Non-treated	1.3 cd	1.8 def	2.3 bcd	1.0 b-e	95.3 a-f
M75GB39	Sprayed	2.5 a	3.3 ab	1.5 c-g	1.0 b-e	67.1 klm
	Non-treated	2.3 ab	3.5 a	5.3 a	1.8 ab	61.1 m
83P17	Sprayed	1.3 cd	1.3 efg	1.3 d-h	0.8 c-f	92 b-g
	Non-treated	1.3 cd	1.3 efg	2.5 bc	1.3 bcd	63.8 lm
W844E	Sprayed	1.0 d	1.3 efg	1.0 e-i	1.0 b-e	80.9 f-k
	Non-treated	1.0 d	1.0 fgh	1.0 e-i	1.3 bcd	89.4 c-i
SP7715	Sprayed	1.3 cd	1.3 efg	1.0 e-i	1.0 b-e	84.7 e-j
	Non-treated	1.3 cd	1.3 efg	1.5 c-g	1.0 b-e	87.2 d-i
M77GB52	Sprayed	2.0 ab	3.0 ab	1.5 c-g	1.8 ab	76.1.0 i-l
	Non-treated	2.0 ab	2.5 bcd	3.3 b	1.5 abc	71.5 j-m
765B	Sprayed	2.0 ab	2.8 abc	1.3 d-h	1.0 b-e	81.7 f-k
	Non-treated	1.8 bc	3.3 ab	5.0 a	2.3 a	80.8 f-k
REV 9782	Sprayed	2.5 a	3.0 ab	1.5 c-g	1.3 bcd	85.6 e-j
	Non-treated	2.3 ab	3.3 ab	5.0 a	1.5 abc	82.6 f-j
Scott 503x15	Sprayed	1.0 d	1.0 fgh	0.3 hi	0.0 f	107.0 a
	Non-treated	1.0 d	1.0 fgh	0.8 f-i	0.5 def	104.0 abc
Scott 504x15	Sprayed	1.0 d	1.0 fgh	0.3 hi	0.5 def	101.0 a-d
	Non-treated	1.0 d	0.8 gh	1.8 c-f	1.3 bcd	93.3 a-f
Scott 506x15	Sprayed	1.0 d	0.8 gh	0.8 f-i	0.0 f	99.4 a-e
	Non-treated	1.0 d	1.3 efg	1.5 c-g	1.0 b-e	100.9 a-d
GX15371	Sprayed	1.3 cd	1.3 efg	0.5 ghi	0.5 def	94.3 a-f
	Non-treated	1.3 cd	1.0 fgh	2.0 cde	0.8 c-f	98.7 a-e
GX15484	Sprayed	1.0 d	0.8 gh	0.5 ghi	0.5 def	89.8 c-i
	Non-treated	1.0 d	1.0 fgh	0.5 ghi	0.8 c-f	88.4 d-i
M71GR75	Sprayed	1.0 d	0.5 gh	0.0 i	0.0 f	92.3 a-g
	Non-treated	1.0 d	0.3 h	0.5 ghi	0.0 f	91.6 b-h
M73GR55	Sprayed	1.0 d	1.0 fgh	0.3 hi	0.5 def	105.5 ab
	Non-treated	1.0 d	1.0 fgh	0.5 ghi	0.8 c-f	100.8 a-d
M60GB31	Sprayed	1.0 d	1.0 fgh	0.8 f-i	0.3 ef	77.6 g-l
	Non-treated	1.0 d	0.3 h	1.3 d-h	0.3 ef	77.1.0 h-l

Means in a column followed by the same letter are not significantly different based on an F protected LSD (P < 0.05).

¹Infestation rating where 0 = no aphids, 1 =1-25 aphids, 2=26-50 aphids, 3=51-100 aphids, 4=101-500 aphids, 5=501-1000 aphids, 6= >1000 aphids.

Table 4. Sugarcane aphid infestation ratings among various sorghum hybrids either sprayed with insecticide or non-treated and yields, Northeast Research Station, St. Joseph, LA 2016.

Hybrid	Insecticide (Sivanto 4 fl-oz)	Infestation rating (0-6 scale) ¹		Yield (bu/ac)
		20 July	27 July	
DKS 3707	Sprayed	0.8 a	1.0 a	63.8 d-i
	Non-treated	0.8 a	1.0 a	65.9 c-h
M75GB39	Sprayed	0.8 a	1.0 a	50.0 ghi
	Non-treated	1.0 a	1.0 a	44.6 i
83P17	Sprayed	0.8 a	1.0 a	57.5 f-i
	Non-treated	1.0 a	1.0 a	64.2 d-i
W844E	Sprayed	1.3 a	1.0 a	66 c-h
	Non-treated	1.0 a	1.0 a	71.2 a-f
SP7715	Sprayed	1.0 a	1.0 a	63.1 e-i
	Non-treated	1.0 a	1.0 a	81.8 a-e
M77GB52	Sprayed	1.0 a	1.0 a	44.6 i
	Non-treated	1.0 a	1.0 a	48.4 hi
765B	Sprayed	0.8 a	1.0 a	69.9 a-g
	Non-treated	1.0 a	1.0 a	68.1 b-h
REV 9782	Sprayed	0.8 a	1.0 a	45.1 i
	Non-treated	1.0 a	1.0 a	48.9 hi
Scott 503x15	Sprayed	1.0 a	1.0 a	49.2 hi
	Non-treated	1.0 a	1.0 a	57.7 f-i
Scott 504x15	Sprayed	0.8 a	1.0 a	85.9 abc
	Non-treated	1.0 a	1.0 a	83.8 a-d
Scott 506x15	Sprayed	1.0 a	1.0 a	72.6 a-f
	Non-treated	1.0 a	1.0 a	73.4 a-f
GX15371	Sprayed	1.0 a	1.0 a	82.3 a-e
	Non-treated	1.0 a	1.0 a	73.3 a-f
GX15484	Sprayed	1.0 a	1.0 a	83.4 a-d
	Non-treated	1.0 a	1.0 a	77.8 a-e
M71GR75	Sprayed	1.0 a	1.0 a	87 ab
	Non-treated	1.0 a	1.0 a	82.8 a-e
M73GR55	Sprayed	1.0 a	1.0 a	89.6 a
	Non-treated	1.0 a	1.0 a	87.9 ab
M60GB31	Sprayed	1.0 a	1.0 a	76.3 a-f
	Non-treated	1.0 a	1.0 a	85.4 abc

Means in a column followed by the same letter are not significantly different based on an F protected LSD (P < 0.05).

¹Infestation rating where 0 = no aphids, 1 =1-25 aphids, 2=26-50 aphids, 3=51-100 aphids, 4=101-500 aphids, 5=501-1000 aphids, 6= >1000 aphids.