Outbreak of Sorghum/Sugarcane Aphid on Sorghum: First Detections, Distribution, and Notes on Management

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ABSTRACT

An outbreak of an invasive aphid was discovered damaging grain sorghum in Texas and neighboring states in 2013. It may be a new variant of sugarcane aphid, *Melanaphis sacchari*, that has a high preference for sorghum, or a very closely related species (*M. sorghi*). We designate it sorghum/sugarcane aphid here (SA). The 2013 outbreak caused severe damage, with producers and crop consultants estimating 25-50% yield loss and total yield loss in some unprotected fields. Infestations were initially observed after sorghum heads were developing, but likely began infesting the crop earlier. Infestations detected were very heavy, often with hundreds of SA per leaf. Leaves became sticky and shiny from honeydew and coated with sooty mold fungus (grows on honeydew) which hampered harvesting operations. Heavy SA populations and honeydew/sooty mold fields were observed in the lower Rio Grande Valley, the Gulf Coast, central Texas Blacklands, and northern counties bordering the Red River, as well as in southern Oklahoma along the Red River and from southwest to northeast Louisiana. Fall populations on remnant sorghum of harvested fields and johnson grass have been detected in many of these counties, positioning the aphid for possible outbreaks next year. Early insecticide trials have identified early management options, and natural enemies have also been observed feeding on SA.

MATERIALS & METHODS

Aphid distribution: Once the outbreak was detected in June, we worked with sorghum producers to survey commercial grain sorghum fields for SA. Location, date of collection, and host plant information was recorded. Sites of the survey were selected based on grower and consultant reports, and observations while conducting other sorghum research. Notes on the presence of natural enemies (aphid predators and parasites) were also taken. Surveys were conducted primarily in August and September to gauge the aphid distribution range in grain sorghum. Additional selected surveys were conducted in November to provide early indication of potential to overwinter.

Damage evaluation: Initial evaluation was done visually at the time of the survey, including observations on the severity of the infestation, plant response, and honey dew/sooty mold. In addition, growers provided damage observations, including estimates of yield decline associated with direct damage and harvest difficulties.

Insecticide Efficacy: Two insecticide efficacy trials were conducted during the fall. The first trial was conducted at China, Texas during early September and the second was in the Rio Grande Valley, Texas during October. Both studies were conducted on grain sorghum using 4 insecticidal treatments and an untreated control. The design of the trials was a randomized complete block with 4 replications. At the China site, aphid counts were taken 4 DAT and 11 DAT while at the Rio Grande Valley location count were taken as a pre-treat and 7 DAT. The sorghum at the China site was in the dough stage, plot size was 4 ft x 50 ft, applied with a hand held CO_2 sprayer, and the location had been treated with Lorsban 4E 2-3 times prior but populations were still high at the time of application.

RESULTS of EFFICACY TRIALS and DAMAGE EVALUATION

Insecticide Efficacy: Response to these insecticides were observed, with some promising results in these initial screenings. Additional trials would add value to this first look. (see table to right).

Damage evaluation: The first infestations was discovered during head development in June. Infestations appeared to begin on lower leaves and moved upward. Honeydew excretion was extensive resulting in growth of sooty mold fungus which hampered harvesting operations. Problems with head elongation and decline of young fall-sown plants in the Rio Grande Valley were also observed.

Although no experimental yield loss data are available, some farmers and crop consultants reported estimated losses of between 50 and 100% due to a combination of plant damage and yield loss from harvest difficulties. We know for certain a farmer in Chambers County did not harvest his grain sorghum crop because of extensive SA damage. Another farmer in Liberty County estimated 50% yield loss comparing two adjacent protected and unprotected fields.

RESULTS of APHID DISTRIBUTION

Aphid distribution: Heavy SA populations and honeydew sooty mold fields were observed in fields where growers had concerns. This aphid's range expansion within one growing season has been impressive and alarming. SA expanded its range from southeast Texas and Gulf Coast Counties up to northeast Texas/southeast Oklahoma. It also has been detected from southwest to northeast Louisiana parishes. Fall populations (observations in November) on sorghum remnants in harvested fields, Johnson grass, and corn have been detected in many of these counties, positioning the aphid for possible outbreaks next year. Aphid natural enemies were also detected, including predatory beetles (lady bugs), predatory flies (hover flies), and parasites (aphelinid parasitoids), but populations of aphids were seen at the same time.

In addition to sorghum in the 22 Texas counties and locations in Oklahoma and Louisiana where SA has been detected (see below), other sorghum growing counties in this geographic range are likely at risk. This is a semi-tropical aphid, but further range expansion into western TX, OK, AR, and MS is a possibility, depending on weather and host plants. The aphid certainly has shown an ability to spread rapidly.

Outbreak SA of sorghum in summer 2013 (top left, Beaumont), fall population on Johnson grass (bottom left, Corpus Christi). Note the presence of a few winged aphids and many unwinged aphids. Severe whole plant damage (top right, Beaumont), and close-up of sooty mold/honeydew damage (bottom right, Corpus Christi).

Mean aphid data for foliar insecticide treatments for Sorghum/Sugarcane aphid control. China, TX and Rio Grande Valley, TX. 2013.

TRIAL #1. CHINA, TEXAS, Host Plant: Grain Sorghum

Treatment	Rate (per acre)	Number of Aphids /leaf 4 DAT	11 DAT
Lorsban Advanced (chlorpyrifos)	1 qt	14.4 b	13.0
Transform WG (sulfoxaflor)	0.75 oz	0.8 b	0.0
Karate Z (lambda-Cyhalothrin)	2 oz	176.0 a	0.1
Dimethoate 4EC (dimethoate)	1 pt	3.3 b	0.6
Untreated	--	99.9 a	0.0

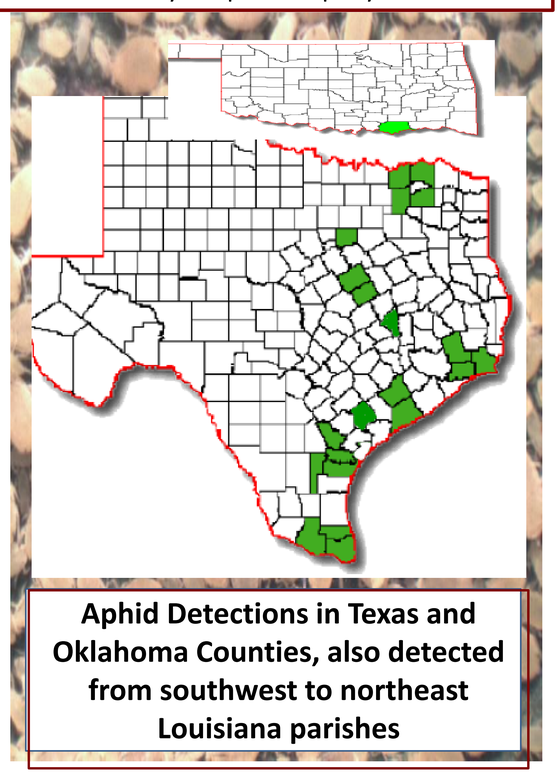
Means in a column followed by the same or no letter are not significantly (NS) different (P= 0.05, ANOVA and LSD).

TRIAL #2. RIO GRANDE VALLEY, TEXAS, Host Plant: Grain Sorghum

Treatment	Rate (per acre)	Number of Aphids /leaf Pretreat	7 DAT
Lorsban Advanced (chlorpyrifos)	1 qt	1104.4	696.1
Transform WG (sulfoxaflor)	0.75 fl oz	922.7	153.2
Admire Pro (imidacloprid)	8 fl oz	501.4	293.7
Asana XL (esfenvalerate)	10 fl oz	1190.8	356.7
Dimethoate 4EC (dimethoate)	1 pt	281.7	189.3
Untreated	--	761.6	286.2

COUNTIES WITH SORGHUM/SUGARCANE APHID COLLECTIONS
(South to North on the Map)

#	COUNTY	DATE of COLLECTION	HOST PLANT(s
1	Cameron	11/16/2013	Grain sorghum
2	Willacy	11/16/2013	Grain sorghum
3	Hidalgo	10/26/2013 and 11/16/2013	Grain sorghum/Johnsongrass
4	Nueces	Aug./Oct./Nov.	Grain sorghum/Corn/Johnsongrass/remnant sorghum/sorghum sudan & Greenhouse:grain sorghum & Lahoma sudangrass
5	Jim Wells	10/30/2013	Corn/Johnsongrass/Sorghum-sudan
6	San Patricio	10/30/2013	Johnsongrass/Grain sorghum
7	Bee	11/6/2013	Corn/Johnsongrass/Grain sorghum
8	Victoria	10/29 & 11/1/2013	Grain sorghum
9	Matagorda	8/12/2013	Grain sorghum
10	Wharton	10/30/2013	Grain sorghum
11	Chambers	6/15 & 28/2013	Grain sorghum
12	Jefferson	6/15/2013	Sweet sorghum/Grain Sorghum
13	Liberty	6/10/2103	Grain sorghum
14	Brazos	October	Grain sorghum
15	Falls	8/22/2013	Double cropped grain sorghum
16	McLennan	11/13/2013	Sorghum/Johnsongrasss
17	Johnson	11/13/2013	Sorghum sudan /Johnsongrass
18	Hopkins	9/11/2013	Johnsongrass/Grain sorghum
19	Hunt	9/11/2013	Sorghum sudan/Johnsongrass/Grain sorghum
20	Lamar	8/23/2013	Grain sorghum
21	Fannin	9/10/2013	Sorghum sudan/Johnsongrass/Grain sorghum
22	Bryan (OK)	9/10/2013	Johnsongrass/Grain sorghum



Aphid Detections in Texas and Oklahoma Counties, also detected from southwest to northeast Louisiana parishes

LOOKING FORWARD and ACKNOWLEDGEMENTS

Further work on identification and aphid distribution range, damage evaluation and economic thresholds, management tactics including biological control, plant resistance and chemical control need to be prioritized.

Thanks to the many grain sorghum producers who first noticed damaged fields and invited us to their fields. Thanks to David Kerns, Louisiana State University, for reports on aphid observations in Louisiana. Thanks to industry for providing insecticide products. And many thanks to the Texas Grain Sorghum Board, and United Sorghum Checkoff for their encouragement to address this pest.