

APHIX™ SUGARCANE APHID TOLERANCE IN NORTH AMERICA

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Weather extremes caused by global warming lead to greater abiotic stresses challenging food and fiber production. Grain and forage sorghums are more tolerant to drought and higher temperatures than other crops and thus will help meet the food demands of a growing population. In 2013 a new pest of sorghum identified as the sugarcane aphid (*Melanaphis sacchari*) began infesting fields in South and Central Texas and Northern Mexico. In subsequent years the aphid moved in to additional North American sorghum markets which resulted in a large reduction of the area planted to sorghum.

Hybrids with varying levels of tolerance were identified thus reducing reliance on insecticides to control aphid populations. Using germplasm from Advanta's collection, hybrids with high yield potential were also discovered to have elite levels of tolerance to the sugarcane aphid and are now being sold under the Advanta US, Inc. Aphix™ brand. Current breeding advances at Advanta Seeds are resulting in additional high yielding hybrids that fit the different segments of the North American market with elite levels of sugarcane aphid tolerance.

INTRODUCTION

Beginning in 2013 a new pest appeared in sorghum fields of North America in South and Central Texas that was identified as the sugarcane aphid (*Melanaphis sacchari*). In 2014 and 2015 the sugarcane aphid (SCA) spread through the majority of the North American sorghum growing areas (Figure 1; Medina et al., 2017) including North and Central Mexico.

Presence of tolerant hybrids were found to be few and TX2783 (PI 656001; Peterson et al., 1984) was identified as a sorghum line with tolerance. Both TX2783 and the hybrid combination with TX2752 (GP-97; Johnson et al., 1982) were used as checks for testing commercial hybrids for tolerance.

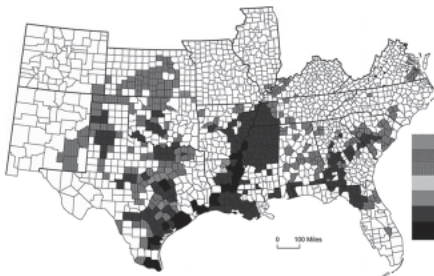


Figure 1. Geographic Distribution of sugarcane aphid (*Melanaphis sacchari*) in the United States from 2013-2015.

RESULTS & DISCUSSION

A threshold of 7.0 (Figure 2) was used to denote a hybrid with elite levels of tolerance to the SCA. Among the hybrids either offered commercially or near commercialization, ALTA AG1201 (USA), ALTA AG1301 (USA), ALTA AG1203 (USA), and ATLA/Advanta ADV G3247 (USA/Mexico) were shown to possess elite levels of tolerance. Additionally ALTA/Advanta ADV G3247 showed statistically significant tolerance to the SCA over the industry check TX2752/TX2783 but not TX2783. Advanta hybrids AG1101 (USA), AG1401 (USA), AG2103 (USA), AG2115 (USA), UPM219 (Mexico) all showed susceptibility to the SCA biotype present in North America and were significantly less tolerant than TX2783 and TX2752/TX2783. The Advanta Hybrid ADV G3157 (USA) had average tolerance lower than 7.0 and was significantly lower for sca tolerance than ALTA/Advanta ADV G3247 but not the tolerant checks TX2783 and TX2752/TX2783.

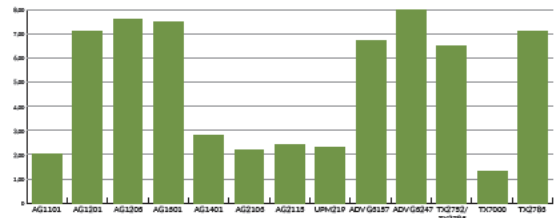


Figure 2. Ratings for Tolerance to the sugarcane aphid Among 11 Hybrids Sold by Advanta US, Inc. and Susceptible and Tolerant Checks.

MATERIALS & METHODS

A total of 10 hybrids offered by Advanta for the North American branded business were submitted to the USDA-ARS at Stillwater, Oklahoma (USA) for screening for tolerance to SCA. Root-trainers were filled with sterile potting soil and each cell was planted with 3 seeds to ensure adequate plant stand establishment. A randomized design with 3 replications was used. Ten days after emergence, each flat was placed in to a growth chamber with SCA infested host plants. The susceptible line TX7000 (PI 655986; Smith and Frederickson, 2000) and TX2783 and TX2752/TX2783 were used as tolerant checks. The infestation duration lasted 3 weeks until susceptible check TX7000 was dead and the hybrids were rated. Analysis was performed using PROC GLM in SAS.

The market dynamics of North America have shifted from high yielding hybrids to high yielding hybrids with SCA tolerance. In order to help producers identify hybrids with elite levels of SCA tolerance, Advanta US, Inc. has introduced the APHIX™ brand and trademark for hybrids that meet strict criteria for sca tolerance using on farm trials, internal screening utilizing late planted nurseries, and 3rd party public research groups. Figure 3 shows ALTA APHIX™ AG1203 next to a susceptible hybrid in an Research and Development plot that was lost to SCA infestation near Abilene, Kansas (USA) in 2016.



Figure 3: Susceptible Experimental Hybrid vs ALTA APHIX™ AG1203; Abilene, Kansas, 2016

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