Sugarcane Aphid Plant Injury, Residual, and Yield Response following Insecticide Applications in Three Texas Studies

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ABSTRACT

The sugarcane aphid (*Melanaphis sacchari*) is an emerging pest of sorghum. Because this pest can cause significant economic injury to sorghum at various stages of growth, it is necessary to evaluate field efficacy of available and potential alternative insecticides. Endigo ZC (thiamethoxam+lamda-cyhalothrin, Syngenta, 5 oz./acre), Transform WG (sulfoxaflor, Dow, 1 oz./acre), Sivanto (flupyradifurone, Bayer, 4 oz./acre), and Baythroid (cyfluthrin, Bayer, 2.4 oz./acre), were evaluated for efficacy against the sugarcane aphid on sorghum in a commercial field near Rosenberg, Texas. Transform WG (1 oz./acre), Sivanto (4 and 7 oz./acre), Centric (thiamethoxam, Syngenta, 2 oz./acre), Nufos (chlorpyrifos, Cheminova, 1 qt./acre), and Baythroid (2.4 oz./acre) were evaluated for efficacy against the sugarcane aphid on sorghum in a commercial field near Sinton, Texas. At the Rosenberg location, aphid counts were taken at 3, 8, 15, 19, and 23 days after treatment (DAT). Field applications of insecticides to populations of sugarcane aphids showed that Endigo ZC, Sivanto, and Transform WG reduced aphid populations at 3, 8, and 15 DAT compared to the non-treated check. At the Sinton location, aphid counts were taken at 7 and 14 DAT. Sivanto (both rates), Centric, Transform WG, and Nufos reduced aphid populations, compared to the non-treated plots, at 7 and 14 DAT. At Rosenberg and Sinton, Baythroid treatments did not decrease aphid populations, compared to the non-treated check. Transform WG (1 oz./acre), Sivanto (4 and 8 oz./acre), Centric (2.5 oz./acre), Lorsban Advanced (chlorpyrifos, Dow, 1 qt./acre), and Fulfill (Pymetrozine, Syngenta, 5 oz./acre) were evaluated for efficacy against the sugarcane aphid on sorghum at the AgriLife Research and Extension Center in Beaumont. Results were consistent with trials performed in 2014.

INTRODUCTION

Grain sorghum, *Sorghum bicolor* L., is an important crop in Texas and the Southern United States. In 2015, there were 2.49 million planted acres in Texas and nearly 8 million acres in the U.S., increases of 4.7% and 22.3% from 2014, respectively (USDA-FSA, 2015). The key insect pests of sorghum include several aphid species, sorghum midge, and headworms. Methods for chemical and cultural control of these pests are well known (Cronholm, et al. 2007). The first report of the sugarcane aphid, *Melanaphis sacchari*, in the continental United States was on sugarcane in Florida in 1977 (Denmark 1988). While Denmark also reported that sugarcane aphid would feed on *Sorghum spp.*, it was not considered a pest until the recent outbreak that was first detected on grain sorghum along the Texas Gulf Coast in 2013.

In 2013, this new pest of grain sorghum was detected in 38 counties and parishes in Texas, Louisiana, Oklahoma, and Mississippi (Villanueva et al. 2014). Confirmed sugarcane aphid populations increased to 12 states and more than 300 counties in 2014, and 17 states and more than 400 counties in 2015 (See Plate 1) (Bowling, et al. In Press). The recent increase in the prevalence of this pest and its potential to impact sorghum production in Texas and other sorghum producing areas prompted this project with the objective of summarizing insecticide efficacy against sugarcane aphid at AgriLife Research and Extension Centers in Beaumont and Corpus Christi.

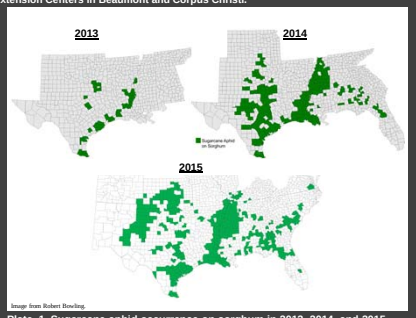


Plate 1. Sugarcane aphid occurrence on sorghum in 2013, 2014, and 2015

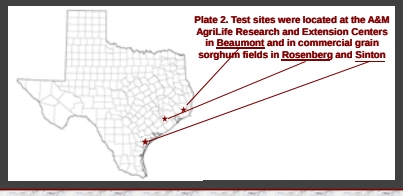
MATERIALS and METHODS

The performance of eight insecticides or insecticide combinations in selected formulations and rates were evaluated for efficacy against sugarcane aphid in three field trials (Table 1). Rates are listed in middle panel graphs. Spray volume (13 GPA and higher) and other test details listed in the top-right panel. Aphid counts per leaf were estimated 3 to 23 days after treatment.

Table 1. Insecticides evaluated against sugarcane aphid in 2014.

Common Name	Trade Name (s)	Formulation
Chlorpyrifos	Lorsban Advanced, Nufos	4EC
Dimethoate	Dimethoate	4EC
Flupyradifurone	Sivanto	SL
Lamda-cyhalothrin + Thiamethoxam	Endigo ZC	2.06EC
Beta-cyfluthrin	Baythroid XL	L
Pymetrozine	Fulfill	50WG
Sulfoxaflor	Transform	WG
Thiamethoxam	Centric	40WG

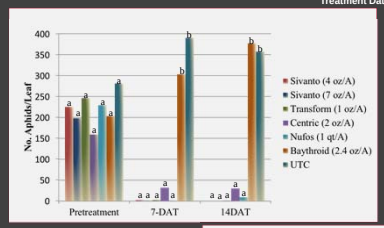
Studies were performed in commercial grain sorghum fields in Rosenberg, TX, Sinton, TX and at the Beaumont Research Station (Texas A&M AgriLife) near Beaumont, TX, during 2015 (Plate 2).

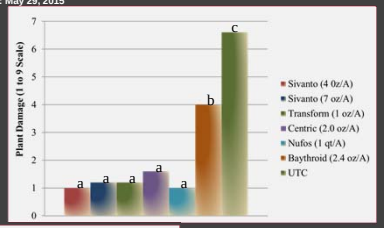


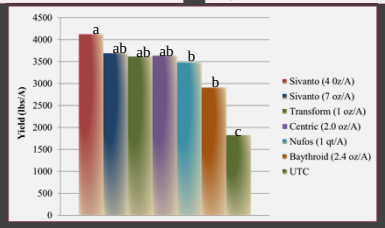
RESULTS

Field Location: Commercial Grain Sorghum Field - Sinton, Texas

Number of Aphids 7 and 14 Days After Treatment, Plant Damage 14 Days after Treatment and Yield
Treatment Date: May 29, 2015

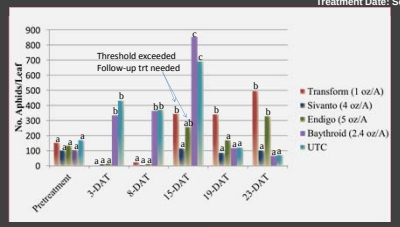


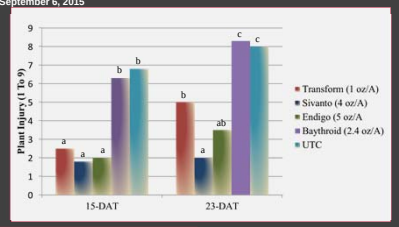


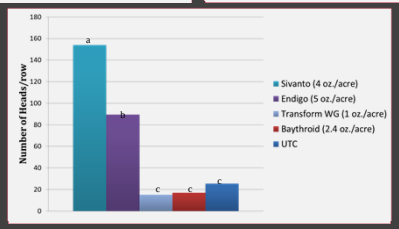


Field Location: Commercial Grain Sorghum Field, Rosenberg, Texas

Number of Aphids 3, 8, 15, 19, and 23 Days After Treatment, Plant Damage 15 and 23 Days after Treatment and Number of heads per plot
Treatment Date: September 6, 2015

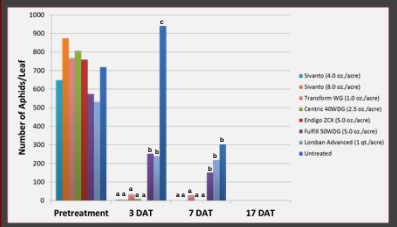


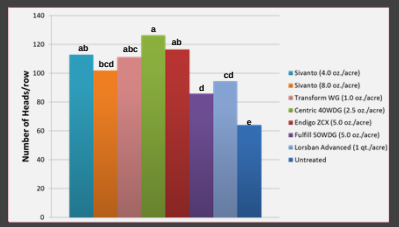




Field Location: Beaumont Research and Extension Center

Number of Aphids 3, 7 and 17 Days After Treatment and Number of heads per row
Treatment Date: August 28, 2015





RESULTS: Within a test date, bars with a common letter are not significantly different.

MATERIALS and METHODS

The trial in Sinton was initiated May 29. Plots measured 20 feet by four rows with 30" row spacing arranged in a randomized complete block design with three replications. Treatments were made at heading/early bloom with a hand-held CO_2 assisted boom sprayer with a total spray volume of 13.5 gallons per acre. Pretreatment sugarcane aphid counts made one day prior to insecticide applications. 20 random leaves (10 each from upper and lower canopy) were sampled from the inner two rows of each plot at 7 and 14 days after treatment. Additionally, a 1-9 rating considering leaf chlorosis (similar to what was described by Webster, et al.), honeydew/sooty mold, and leaf death was used to rate plots at 14 days after treatment. Data were analyzed using analysis of variance and mean separation was performed using LSD.

The trial in Rosenberg was initiated September 6, 2015. Plots measured 20 feet by 4 rows with 40" spacing arranged in a randomized complete block design with 3 replications. The trial was performed on re-growth that was initially harvested in July; the primary crop was never sprayed for sugarcane aphid. Plots were sprayed on September 6. Pretreatment sugarcane aphid counts made three days prior to insecticide applications. Sorghum was pre-boot to boot stage. Insecticide applications were made with a hand-held CO_2 assisted boom sprayer with total spray volume of 13.5 gallons per acre. 20 random leaves (10 each from upper and lower canopy) were sampled from the inner two rows of each plot at 3, 8, 15, 19, and 23 days after treatment. Additionally, a 1-9 rating considering leaf chlorosis (similar to what was described by Webster, et al.), honeydew/sooty mold, and leaf death was used to rate plots at 15 and 23 days after treatment. Heads were counted on October 20. Data were analyzed using analysis of variance and mean separation was performed using LSD.

The trial at the Beaumont Research and Extension Center was planted June 14, 2015. Plots measured 35 feet by two rows with 30" spacing arranged in a randomized complete block design with four replications. An artificial infestation with sugarcane aphid was attempted on August 22 but was unsuccessful. Natural infestation increased from that point. Treatments were applied August 28 with a 3-nozzle, hand-held, CO_2 powered spray boom (800067 nozzles, 50 mesh screens) with a final spray volume of 13.7 gallons per acre. Aphid counts were performed as follows: 5 leaves per plot on Aug. 27, 10 leaves per plot on Aug 31. and Sept. 4, and 20 leaves per plot on Sept. 14. Heads were counted on October 8. Data were analyzed using analysis of variance and mean separation was performed using LSD.

SUMMARY

- In the trial at Sinton, Sivanto, Transform WG, Centric 40WDG, and Nufos reduced aphid populations at 7, and 14 days after treatment, compared to the Baythroid XL and non-treated plots
- In Rosenberg, Transform WG and Endigo ZC reduced aphid populations 3 and 8 days after treatment, compared to Baythroid XL and the non-treated plots. Sivanto reduced aphid populations at 3, 8, and 15 days, compared to the Baythroid XL and non-treated plots
- In Beaumont, Sivanto (both rates), Endigo ZC, Transform WG, and Centric 40WDG reduced aphid populations at 3 and 7 days after treatment compared to Fulfill 50WDG, Lorsban Advanced, and non-treated plots. Lorsban Advanced and Fulfill 50WDG reduced aphid populations at 3 days after treatment, but not 7 days, compared to non-treated plots
- Both rates of Sivanto (4 and 7 oz. in Sinton, 4 and 8 oz. in Beaumont) were comparable in aphid population reduction, residual performance, and yield measures. Transform WG, Endigo ZC, Sivanto, and Centric 40 WDG effectively reduced aphid populations in both field trials
- In Sinton and Rosenberg, Sivanto, Transform WG, and Endigo ZC resulted in lower plant damage ratings across all sampling dates, compared to Baythroid XL and non-treated plots
- In Sinton, all insecticide Treatments resulted in increased yield compared to the non-treated plots. Sivanto (4 oz./acre) treatments had better yield than Nufos and Baythroid XL, but were not different from Transform WG, Centric 40WDG or the 7 oz./acre Sivanto treatment
- In Rosenberg, the Sivanto treated plots produced more heads than all other plots. Endigo treated plots produced more heads than Transform WG, Baythroid XL and non-treated plots.
- Residual activity of Sivanto, Transform WG, Endigo ZC, and Centric 40WDG, of approximately 10-14 days is consistent with what was observed in 2014.

Note: High spray volume is critical (using 13+ GPA or higher here) to penetrate the dense plant canopy and to obtain high efficacy.

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This poster and additional information is available at
http://ccag.tamu.edu/sorghum-insect-pests