Efficacy of Insecticides in Management of Sugarcane Aphid on Sorghum In Texas

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ABSTRACT

The sugarcane aphid (*Melanaphis sacchari*) is an emerging pest of sorghum in Texas, across the south, and into the Great Plains states. With the potential for this pest to cause significant economic injury to sorghum at various stages of growth, it is necessary to evaluate field efficacy of available insecticides. Endigo ZC (thiamethoxam+lamda-cyhalothrin), Transform WG (sulfoxaflor), Sivanto (flupyradifurone), Chlorpyrifos, and Dimethoate, were evaluated for efficacy against the sugarcane aphid on sorghum at the Texas A&M Agrilife Research and Extension Centers in Corpus Christi and Beaumont. At the Corpus Christi location, aphid counts were taken at 3, 7, and 14 days after treatment. Field applications of insecticides at label rates to populations of sugarcane aphids showed that Endigo ZC and Transform WG reduced aphid populations at 3, 7, and 14 days after treatment and Sivanto reduced populations at 7 and 14 days after treatment, compared to the non-treated check. There was no difference in presence of parasitized aphids at 7 days after treatment, suggesting that insecticide application had little effect on parasitoid wasp populations. At the Beaumont location, Centric, Endigo ZC, Sivanto, and Transform WG reduced aphid populations, compared to the non-treated plots, at 2, 5, and 9 days after treatment, and the 0.75 oz/A rate of Transform WG was as effective as the 1.5 oz/A rate at reducing aphid populations. At Corpus Christi and Beaumont, Chlorpyrifos and Dimethoate treatments did not decrease aphid populations, compared to the non-treated check. We thank Justin Schmidt, Luke Pruter, and James Glover for help in data collection.

INTRODUCTION

Grain sorghum, *Sorghum bicolor* L., is an important crop in Texas agriculture. In 2014, there were three million planted acres that produced a crop worth more than $600 million (USDA-NASS, 2014). 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 a recent host change.

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). Some producers reported grain losses of up to fifty percent due to plant damage by the aphid and harvesting inefficiency related to honeydew production. In 2014, sugarcane aphid was reported in more than 150 counties and parishes in Texas, Oklahoma, Louisiana, Arkansas, Kansas, Mississippi, Tennessee, Alabama, Georgia, and Florida (Plate 1). 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.

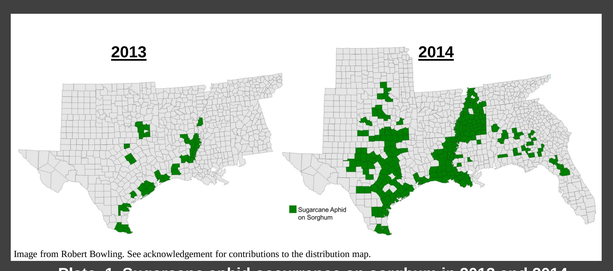


Image from Robert Bowling. See acknowledgement for contributions to the distribution map.

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

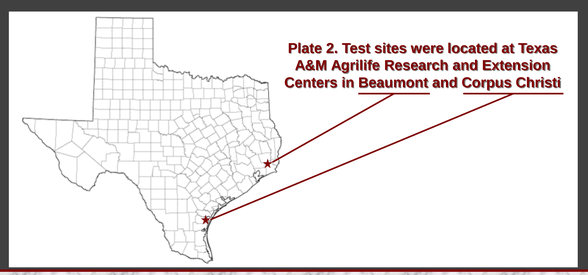
MATERIALS and METHODS

The performance of seven insecticides or insecticide combinations in selected formulations and rates were evaluated for efficacy against sugarcane aphid in two field trials (Table 1). Rates are listed in middle panel graphs. Spray volume (14 GPA and higher) and other test details listed in the top-right panel. Aphid counts per leaf were estimated 2 to 16 days after treatment, and selected natural enemy information was also recorded.

Table 1. Insecticides evaluated against sugarcane aphid in 2014.

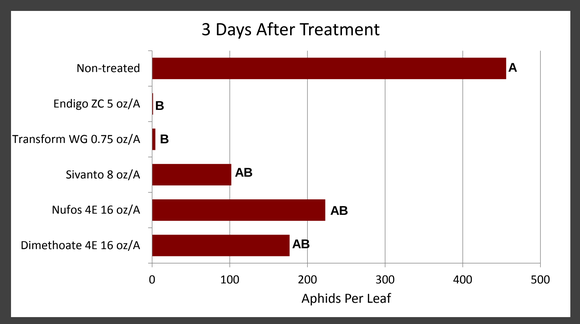
Common Name	Trade Name (s)	Formulation
Chlorpyrifos	Lorsban Advanced, Nufos	4EC
Dimethoate	Dimethoate	4EC
Flupyradifurone	Sivanto	SL
Lamda-cyhalothrin + Thiamethoxam	Endigo ZC	2.06EC
Pymetrozine	Fulfill	50WG
Sulfoxaflor	Transform	WG
Thiamethoxam	Centric	40WG

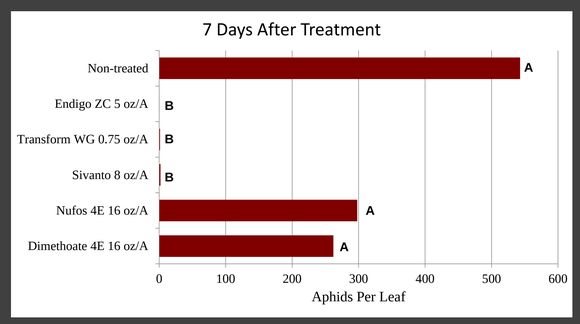
All studies were performed at the Corpus Christi Research Station (Texas A&M Agrilife) near Corpus Christi, TX or at the Beaumont Research Station (Texas A&M Agrilife) near Beaumont, TX, during 2014 (Plate 2).

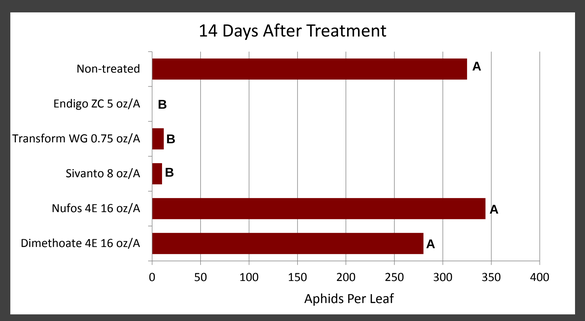


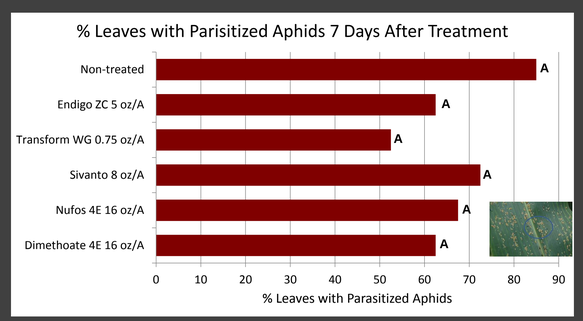
RESULTS

Field Location: Corpus Christi Research and Extension Center
Treatment Date: June 17, 2014

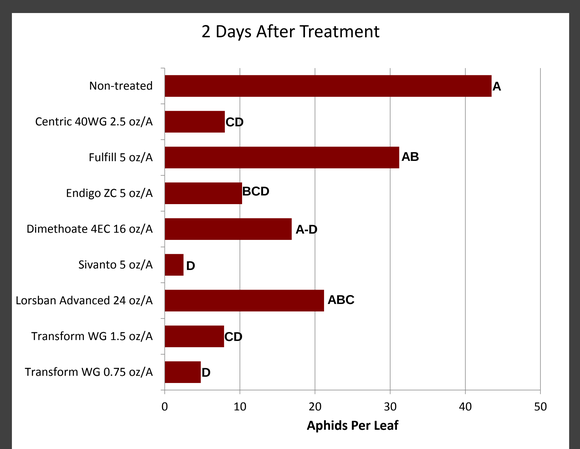


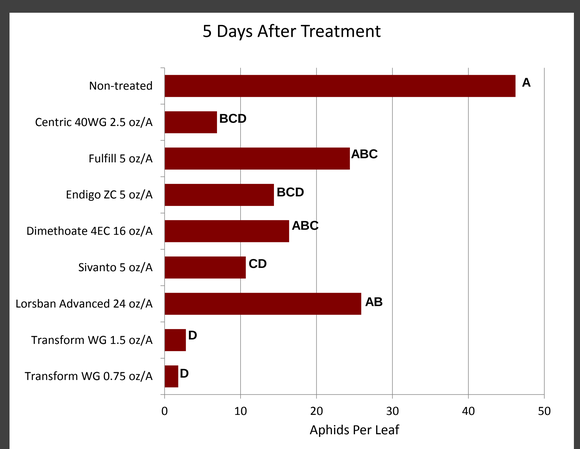


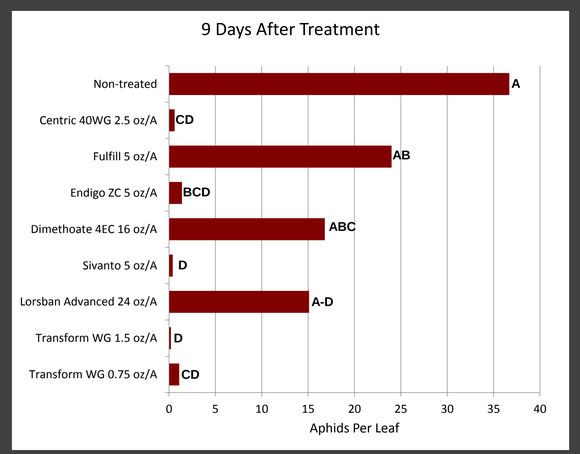


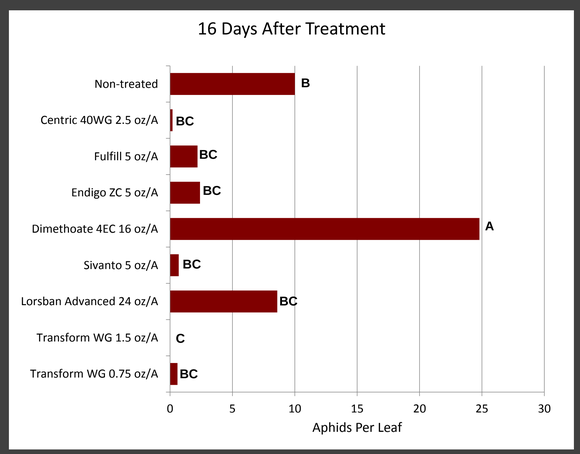


Field Location: Beaumont Research and Extension Center
Treatment Date: September 24, 2014









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

MATERIALS and METHODS

The trial at the Corpus Christi Research and Extension Center was planted April 11, 2014 and emerged April 16. Plots measured 40 feet by 4 rows with 40" spacing arranged in a randomized complete block design with 4 replications. Aphids were first detected at the 5/6 leaf stage and plots were sprayed on June 17 when aphid populations reached 500 per leaf at the flag leaf stage. Plots were sprayed with a broadcast boom using hollow tips (ConejJet TX-12) at 14 gallons per acre. 20 random leaves (10 each from upper and lower canopy) were collected from the inner two rows of each plot at 3, 7, and 14 days after treatment to perform aphid counts. Additionally, the percentage of leaves containing parasitized aphids was measured at 7 days after treatment. Data were analyzed using analysis of variance and mean separation was performed using Tukey's method for multiple pairwise comparisons.

The trial at the Beaumont Research and Extension Center was planted May 21, 2014 and emerged May 29. Plots measured 20 feet by four 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. Pre-treatment counts were taken on September 23 and insecticide treatments were applied on September 24. Plots were sprayed with a three-nozzle boom sprayer using flat fan tips (TeeJet 800067) at 25 gallons per acre. To perform aphid counts, leaves from random plants were collected from the inner two rows of each plot (10 per plot on September 23 and October 3, 20 per plot on September 26, 29 and October 10). Data were analyzed using analysis of variance and mean separation was performed using Fisher's protected ISD.

Plate 3 a & b. Potential population growth of sugarcane aphid on sorghum

Plate 4 a & b. Progression of damage caused by sugarcane aphid on sorghum

SUMMARY

In the trial at Corpus Christi, Endigo ZC and Transform WG reduced aphid populations at 3, 7, and 14 days after treatment and Sivanto reduced populations at 7 and 14 days after treatment, compared to non-treated plots

- In Beaumont, Centric, Endigo ZC, Sivanto, and Transform WG (0.75 and 1.5 oz/A) reduced aphid populations, compared to the non-treated plots, at 2, 5, and 9 days after treatment
- Lorsban Advanced, Nufos (both Chlorpyrifos a.i.), and Dimethoate treatments did not reduce aphid populations when compared to the non-treated plots at any time after treatment
- in Beaumont, the 0.75 oz/A rate of Transform WG was as effective as the 1.5 oz/A rate at reducing aphid populations
- Transform WG, Endigo ZC, Sivanto, and Centric effectively reduced aphid populations in both field trials
- There was no difference in presence of parasitized aphids at 7 days after treatment, suggesting that insecticide application had little to modelest effect on parasitoid activity.

Note: High spray volume appeared critical (using 14 GPA or higher here) to penetrate the dense plant canopy and to obtain high efficacy. Reduced efficacy was seen in a companion test conducted by a cooperator when using 5 GPA.

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This poster and additional information is available at
http://ccag.tamu.edu/sugarcane-aphid