COTTON APHID INSECTICIDE EFFICACY IN THE SOUTHEAST: A TWO-YEAR SUMMARY

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Abstract

Field trials were conducted in the Southeast to evaluate insecticidal control of cotton aphid during 2019 and 2020. Percent control among insecticides varied by location, likely because of variable timing of applications, reinfestation rates, and susceptibilities of cotton aphid populations to some insecticides. Mean percent control for all locations was calculated for the insecticides at 3-5, 7-9, and 14 days after treatment. Mean control ranged from 28-89 percent at 3-5 days after treatment, 4-78 percent control at 7-9 days after treatment, and 17-65 percent control at 14 days after treatment. It should be noted that no insecticide completely eliminated aphids in any trial.

Introduction

Cotton aphids, *Aphis gossypii*, infest a high percentage of cotton acreage in the Southeast and is a potential pest of cotton in the region. This highly polyphagous species feeds and reproduces on many cultivated and weedy plant host plants. Parthenogenic reproduction and a high reproductive capacity make this species prone to developing resistance to insecticides. Historically only a small percentage of cotton acres have been treated with insecticide for control of cotton aphid in the Southeast (Cotton Crop Loss Data at https://www.biochemistry.msstate.edu/resources/cottoncrop.php). However, the recent detection of Cotton leafroll dwarf virus transmitted by cotton aphid, necessitates further investigation into the biology and ecology of cotton aphid in cotton production systems as well as insecticidal control options in the region. The objective of these trials was to summarize insecticidal efficacy of multiple classes of insecticides for cotton aphid.

Materials and Methods

Standard small-plot trials were conducted in six states (VA, NC, SC, GA, AL, and FL) in the southeast during 2019 and 2020 to evaluate insecticides for efficacy on cotton aphid. Plot size ranged from four to eight rows wide and 30 to 40 feet in length and were arranged in a randomized complete block design with four replications. Trials were initiated when aphids were present and alate and apterous aphids were enumerated 4, 7, and 14 days after treatment (DAT) by examining the 4th expanded main stem leaf below the terminal from 10 randomly selected plants in each plot. Yield data were optional. In total 14 active ingredients from multiple classes of insecticides were evaluated for control of cotton aphid and compared with a water control or untreated check (Table 1). Maximum labeled rates were used for most insecticides. A total of 13 trials were conducted and not all treatments were included in each trial.

Application dates occurred during June and July and varied by location. Additionally, aphid counts were not made for all evaluation dates, typically due to a fungal epizootic which significantly reduced aphid infestations. Percent control compared with the untreated was calculated for each insecticide in individual trials. Mean percent control from all trials and standard errors were then calculated for each insecticide. Direct comparisons of percent control of commonly recommended insecticides where location was considered as a replication were subjected to analysis of variance and means were separated using LSD (p=0.05).

Table 1. Insecticides evaluated for control of cotton aphid in cotton during 2019 and 2020 in the Southeast.

Active Ingredient	Trade Name	IRAC Group	Rate
untreated	Water	-	-
dicrotophos	Bidrin 8E	1B	8 fl oz/a
bifenthrin	Brigade 2 EC	3A	6.4 fl oz/a
acetamiprid	Assail 30 WG	4A	1.1 oz/a
thiamethoxam	Centric 40 WG	4A	2.5 oz/a
imidacloprid	Admire Pro 4.6 SC	4A	1.7 fl oz/a
dinotefuran	Venom 70 WG	4A	3.0 oz/a
sulfoxaflor	Transform 50 WG	4C	1.5 oz/a
flupyradifurone	Sivanto prime 1.67	4D	14 fl oz/a
pymetrozine	Fulfill 50 WG	9B	2.75 oz/a
pyrifluquinazon	PQZ 1.87 SC	9B	3.2 fl oz/a
afidopyropen	Sefina 0.42 SC	9D	3.0 fl oz/a
spirotetramat	Movento**	23	5.0 fl oz/a
cyantraniliprole	Exirel 0.83 SC	28	17.0 fl oz/a
flonicamid	Carbine 50 WG	29	2.8 ozs/a

** not labeled in cotton

Results and Discussion

Apterous, or wingless aphids, were the primary form present in trials; alate or winged aphids were present but significant numbers were rarely observed. Thus, total aphids or apterous plus alate forms were reported.

Mean percent control and standard errors at 3-5 DAT, 7-9 DAT, and 14 DAT were calculated for the 14 insecticides evaluated (Figure 1). Note that the number of trials a specific insecticide was evaluated varied by insecticide and evaluation date. Although direct statistical comparisons among treatments were not be made, information on general efficacy and consistency can be gleaned. Although this trial investigated many insecticides, only those commonly used tended to provide the best control of cotton aphid.

Direct comparisons of commonly used insecticides showed that Transform, Assail, Carbine, and Bidrin provided significantly greater control compared with Centric and Admire Pro at 3-5 DAT (Figure 2). At 7-9 DAT, Carbine, Transform, Assail, and Bidrin again provided significantly greater control compared with Centric and Admire Pro. In general, percent control was reduced at 7-9 DAT compared with control at 3-5 DAT. Percent control of the most efficacious insecticides dropped from 77-89 percent control at 3-5 DAT to 62-78 percent control at 7-9 DAT. Percent control of Admire Pro and Centric was 53 and 57 percent control, respectively, at 3-5 DAT and dropped to 24 and 27 percent control, respectively, at 7-9 days after treatment, with similar observations at 14 DAT.

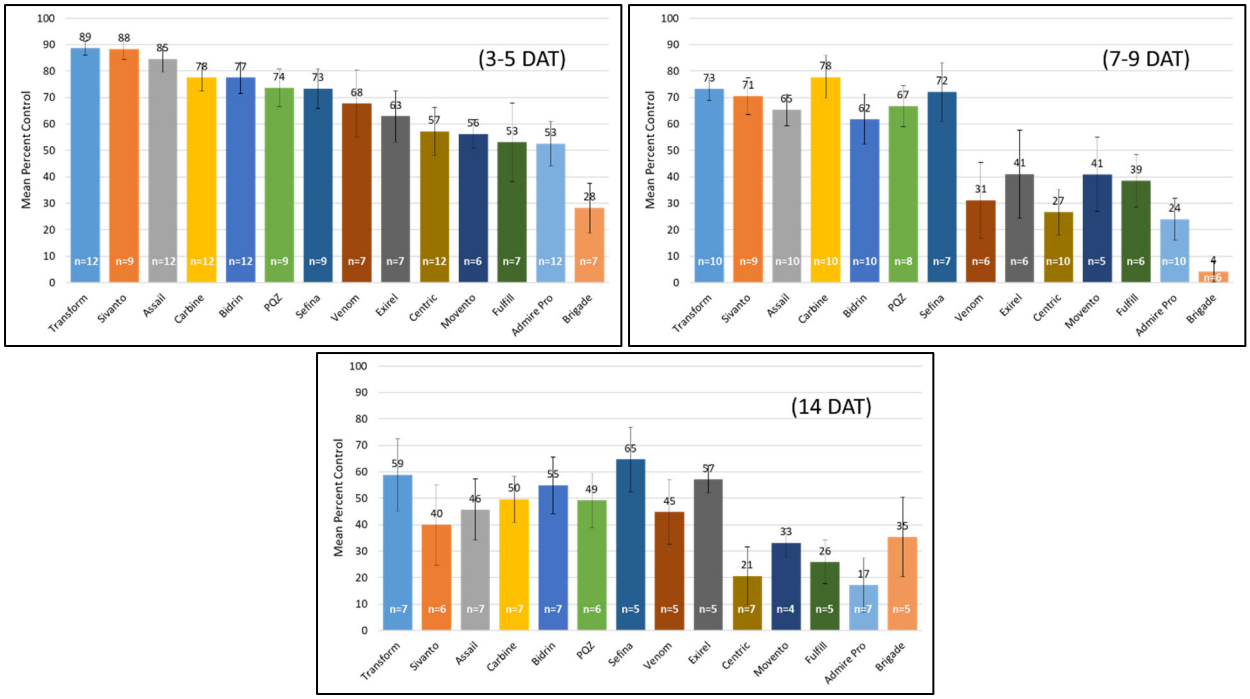

Figure 1. Mean percent control ± standard error of cotton aphids at 3-5, 7-9, and 14 DAT in southeastern cotton during 2019 and 2020.

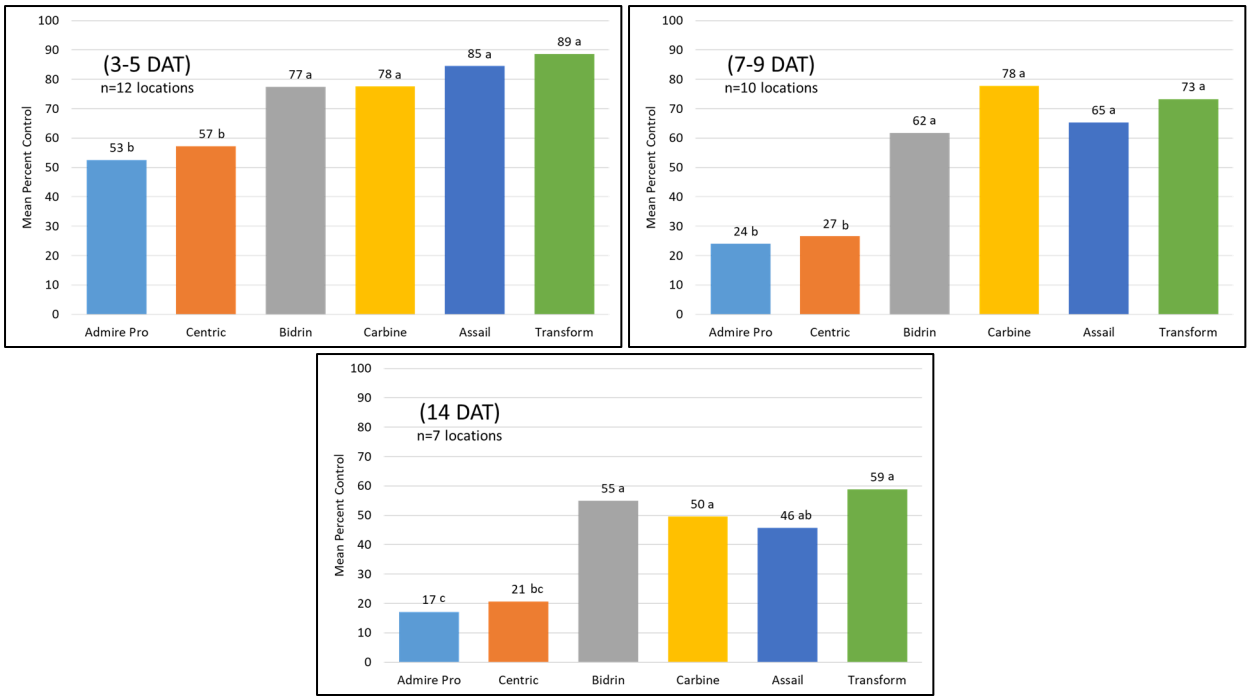

Figure 2. Mean percent control of selected insecticides at 3-5, 7-9, and 14 DAT from trials conducted in the southeastern cotton during 2019 and 2020. Means with the same letter are not significantly different, LSD (p=0.05).

Summary

Cotton aphid insecticide trials conducted in the Southeast during 2019 and 2020 illustrated variable results by location. Differences in insecticide efficacy were likely due to differences in insecticide susceptibility for some insecticides by

location. Timing of application and reinfestation rates also likely influenced percent control. However, these trials summarized insecticide control for a wide range of insecticide classes across multiple environments and application timings providing insight into insecticide performance. It should be noted that no insecticide eliminated cotton aphid.

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