



Evaluation of Insecticides for Aphid Control in Cotton and Impact on Lint Quality and Yield

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Introduction

Cotton aphids, *Aphis gossypii* Glover, are a common economically damaging pest in the Texas High Plains. Cotton yield and quality losses due to this pest are a function of population density, persistence of the population, and cotton crop phenology. The Texas AgriLife Extension Service action threshold for initiating an insecticide application targeting aphids in cotton is 50 aphids per leaf prior to boll opening. When cotton aphids exceed this threshold, current information on efficacious products is crucial for producers to make economically appropriate management decisions.

Objectives

1. To determine the efficacy of new insecticides at mitigating aphid populations in cotton.
2. To evaluate the impact of aphid populations on lint yield and quality.

Materials and Methods

This test was conducted at the Texas AgriLife Research and Extension Center in Lubbock, Texas. The field was planted on June 16 on 40-inch rows, and was irrigated using in furrow irrigation. The test was a randomized complete block design with four replications. Plots were 4-rows wide and 50 feet in length. All treatments were applied with a CO₂ pressurized hand-boom sprayer calibrated to deliver 10 gpa through TX-6 hollow cone nozzles (2 per row) at 40 psi. In order to ensure a testable population of aphids, the plots were initially treated three times at approximately 10 day intervals with 5 oz of Karate plus Diamond at 2 oz per acre beginning July 27.

The number of aphids per leaf were determined by randomly selecting five leaves from the fourth or fifth node down from the terminal, and five main stem leaves from the lower 50 percent of the plant. Percent open boll was determined by counting the number of open and closed bolls in 15-foot subplots per plot. The treatments for this test are outlined in table 1.

Plots were harvested and weighed on November 4 using a two row cotton stripper. The middle two rows of each plot were harvested. 1000 gram burr cotton samples were obtained from each plot and were ginned at the Texas AgriLife Research and Extension Center in Lubbock, TX. HVI quality data was obtained through the Texas Tech Fiber and Biopolymer Research Institute.

All dependent variables were analyzed using PROC MIXED and the means were separated using an F protected LSD ($P \leq 0.05$). Yield correlations were obtained by using a simple linear regression model where the independent variable was the seasonal mean number of aphids (7 DAT) and the dependent variable was yield in lint lbs per acre (Sigma Plot) 2011

Tables and Figures



Aphicide ^a	Active ingredient	Rate (amt-product/acre)
Untreated	--	--
Benevia 10 OD	Cyantraniliprole	13.5 fl-oz
Benevia 10 OD	Cyantraniliprole	16.9 fl-oz
Benevia 10 OD	Cyantraniliprole	20.5 fl-oz
CMT 4586	Spirotetramat + Imidacloprid	8 fl-oz
F9210	Zeta cypermethrin + Bifenthrin + Imidacloprid	4.8 fl-oz
Intruder 70 WP	Acetamiprid	0.8 oz
Centric 45 WG	Thiamethoxam	1.5 oz

^aBenevia included Dyne-Amic at 0.25% v/v, CMT 4586 included MSO at 0.25% v/v and UAN 28% at 2.5% v/v

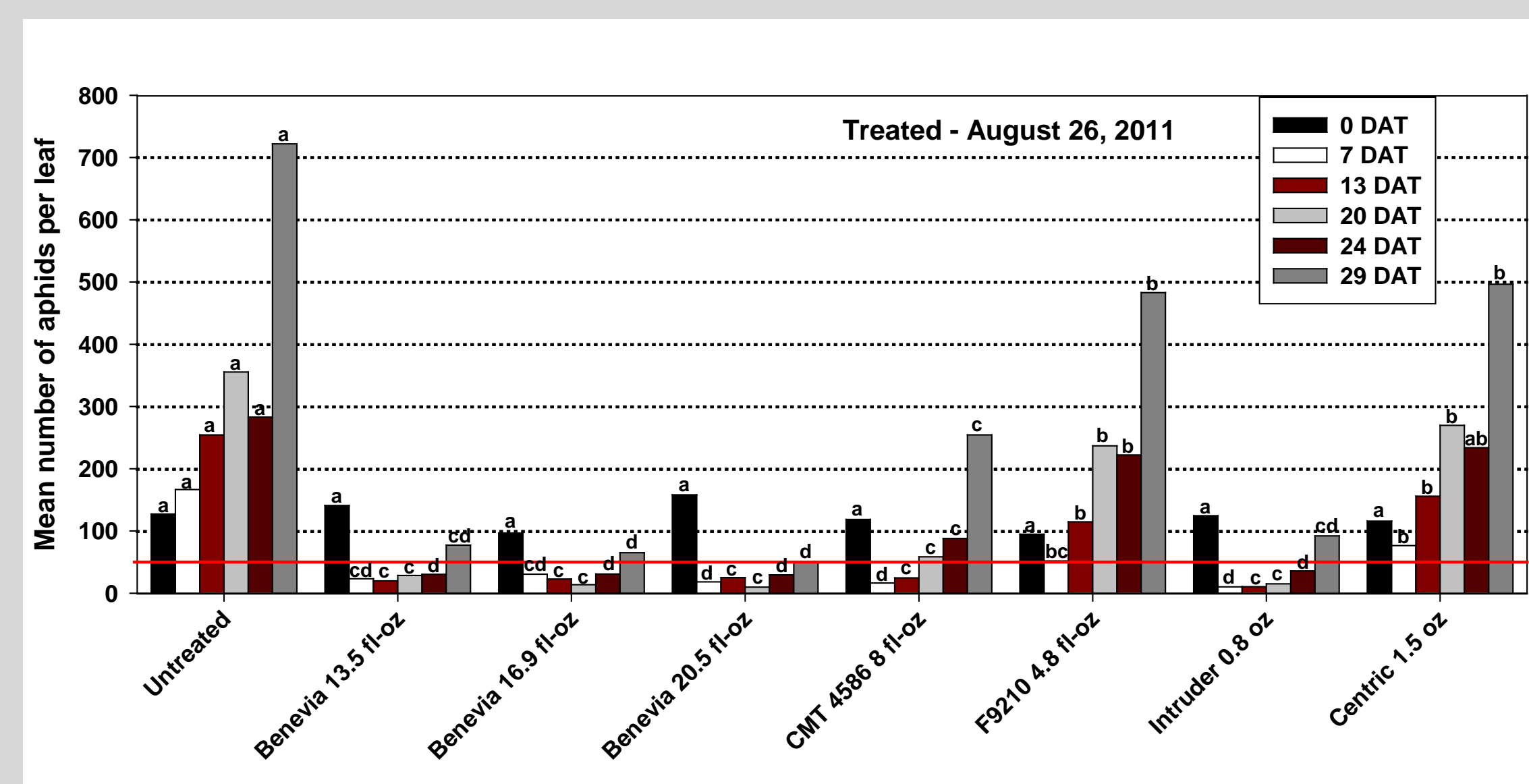
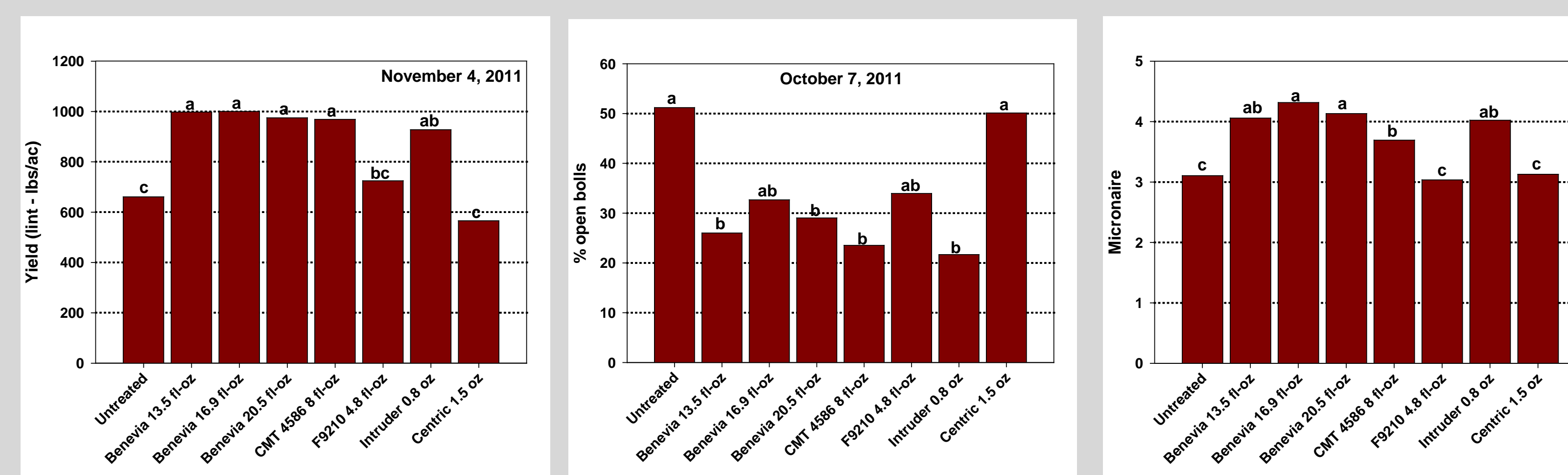


Figure 1. Mean number of aphids per leaf averaged across 3-4 node and mid to lower canopy leaves. Lubbock, Texas 2011. Bars capped by the same letter are not significantly different.



Figures 2,3 & 4. Lint yield in pounds, percent open boll and micronaire. Lubbock, Texas 2011. Bars capped by the same letter are not significantly different.

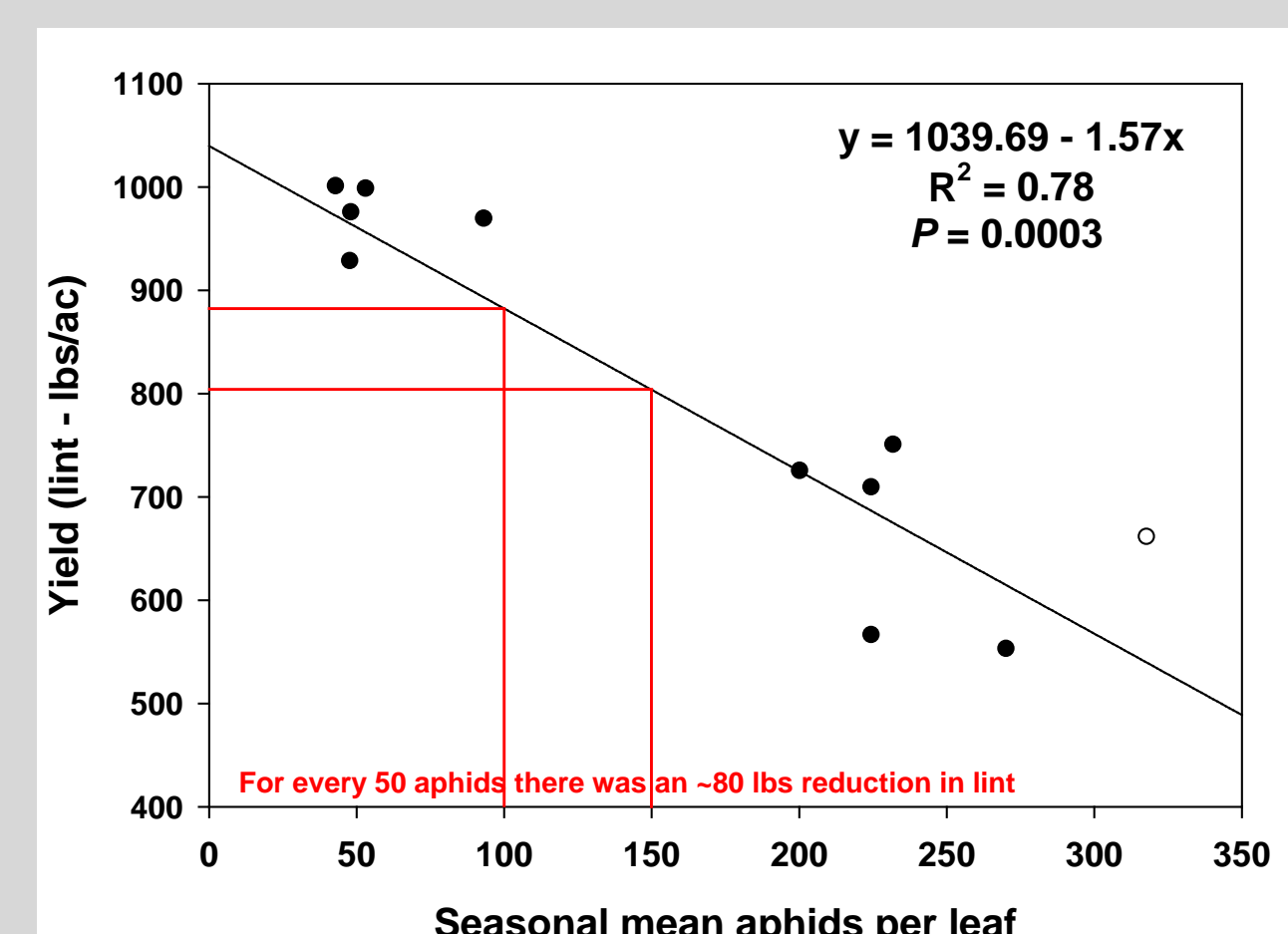


Figure 5. Linear relationship of seasonal mean aphids per leaf and lint yield. Lubbock, Texas 2011.



Results and Discussion

Aphid populations in this test persisted for 30 days. In order to preserve yield, aphid populations were terminated with a mixture of Bidrin at 8.0 fl-oz/ac and Intruder at 1.0 oz/ac when most treatments exceeded threshold.

There were no significant differences in the mean number of aphids per leaf for the zero day post treatment counts (Table 2). Benevia exhibited a rate response with the 20.5 oz rate never exceeding threshold. The 20.5 oz. rate exhibited significantly fewer aphids for the 29 day post treatment counts compared to the 13.5 oz rate. Intruder, one of the Texas High Plains industry standards, exhibited good initial knockdown of aphid populations, but residual activity started to decline after 20 days when compared to the three rates of Benevia and Intruder. F9210 and Centric exhibited initial knockdown of aphid populations after seven days, but aphid populations quickly rebounded to over 100 aphids per leaf at 13 days post treatment.

Most aphid outbreaks in this region rarely persist for more than 21 days. Based on this criteria, all treatments but Centric and F9210 would have given satisfactory control.

Centric and F9210 did not significantly differ in lint pounds per acre when compared to the untreated check with an average of 645 pounds (Figure 2). All three rates of Benevia, CMT 4586, and Intruder did not significantly differ in lint yield per acre with an average of 974 pounds, and all were significantly different when compared to the untreated check.

During the final counts of this test, it was noticed that the plots exhibiting high populations of aphids had an increased percentage of open bolls, when compared to the other treatments. Figure 3 shows that Centric, F9210, and Benevia (16.9 fl-oz) did not significantly differ from the untreated check which had 51 percent open bolls. Fiber fitness and maturity should be directly impacted by early boll opening and can be measured by micronaire. Figure 4 shows that Centric and F9210 did not significantly differ in micronaire when compared to the untreated check with an average value of 3.1. However, Benevia (16.9 fl-oz) had a micronaire value of 4.3 which cannot be explained by the percent open boll data.

The aphid populations in this test occurred from early to late boll fill. The relationship between seasonal mean aphids per leaf and lint pounds per acre in yield shows that for every 50 aphids there was an approximate 80-pound reduction in lint yield (Figure 5). Although the current threshold is 50 per leaf, a lower threshold may be justified.

Acknowledgement

This project was funded in part by Plains Cotton Growers, Inc.

