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CENTRIC® CONTROL OF COTTON APHID (*APHIS GOSSYPII* GLOVER) IN THE MID-SOUTH AND SOUTHEAST

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Abstract

Centric® provides excellent control of a number of sucking and chewing pests in cotton. The active ingredient, thiamethoxam, is a second-generation neonicotinoid insecticide that acts through both contact and ingestion. Thiamethoxam is highly systemic and has chemical properties, which allow it to rapidly penetrate plant tissue, providing a reservoir of active ingredient that is effective against leaf feeding pests. This results in minimal impact on non-target organisms and important beneficial insects that occur in cotton agro-eco systems. Therefore, thiamethoxam is well suited for use in cotton integrated pest management programs. Results from field studies conducted in 2001 further confirmed the effectiveness of Centric for control of the cotton aphid.

Introduction

Thiamethoxam, a second-generation neonicotinoid insecticide, controls a wide spectrum of sucking and chewing insect pests at very low use rates. Insects are controlled by thiamethoxam through both contact and ingestion activity. Thiamethoxam ultimately affects the insect nervous system by blocking the nicotinic acetylcholine receptors, consequently preventing nerve impulses. The affected insects cease feeding within a few hours and mortality generally occurs within 24-48 hours. Numerous studies have been conducted evaluating cross resistance with other insecticide classes and to date no cross resistance with other insecticide classes has been documented.

Thiamethoxam has a low molecular weight, low partition coefficient and relatively high water solubility all of which favor rapid and efficient plant uptake. When applied to the plant foliage thiamethoxam moves rapidly into the leaf and quickly moves throughout the leaf to form a reservoir of the active ingredient inside the leaf where it is protected from the environment. Because of this rapid systemic uptake and degradation by environmental factors thiamethoxam has a short residual on the leaf surface. This results in minimal impact on beneficial organisms and makes thiamethoxam an excellent component of integrated pest management systems. Additionally, due to this systemic nature a variety of application methods may be used to apply thiamethoxam.

Thiamethoxam received a U. S. Registration as Centric® for foliar use in cotton for control of aphids, thrips, whiteflies, fleahoppers and tarnished plant bugs in May 2001. The Centric registration is for use in all states in the cotton belt except CA and AZ. Three other U. S. Registrations for thiamethoxam were also received in 2000 and 2001. Crusier® 5FS was registered for use as a seed treatment in cotton, grain sorghum and wheat in December 2000. Actara® 25 WG was registered for foliar use in fruiting vegetables, cucurbit vegetables, potatoes, pome fruit, tobacco and cotton (CA and AZ) in May 2001. Platinum® 2SC was registered in fruiting vegetables, cucurbit vegetables, potatoes and tobacco in May 2001.

Results of field trials for control of aphids with Centric have been presented at previous Beltwide Cotton Conference meetings (Ferguson et al. 1999, Lawson et al. 1999, Koenig et al. 2000 and Lawson et al. 2000). This manuscript presents results from 2001 field trials conducted by various university researchers across the mid-south and southeast to evaluate control of the cotton aphid with Centric.

Materials and Methods

University personnel in Alabama, Arkansas, Louisiana, Mississippi, North Carolina and Texas conducted sixteen replicated field efficacy trials during 2001. In fourteen trials a single foliar application of Centric along with one or more standards [Assail® (acetamiprid), Bidrin®(dicrotophos), Furadan® (carbofuran) and/or Provado®(imidacloprid)] was directed against populations of cotton aphids. In two trials two foliar applications of all insecticide treatments were made. Centric was applied at 0.047 lbs ai/A, Assail was applied at 0.05-0.056 lbs ai/A, Bidrin was applied at 0.4-0.5 lbs ai/A, Furadan was applied at 0.25 lbs ai/A and Provado was applied at 0.047 lbs ai/A. All treatments were applied using standard ground equipment or a CO2 backpack sprayer. All treatments were arranged in a randomized complete block design and replicated four times. Efficacy evaluations of all compounds were made at 3 (2-4 days) days after treatment (DAT), 7 (5-8 days) DAT and/or 12 DAT by counting the number of cotton aphids on 5-20 leaves per replicated plot. All data was converted to the

number of aphids per ten leaves for this manuscript. Data from individual trials were analyzed using ANOVA, and means were separated using LSD, Duncan's New MRT, Duncan's MRT or Student-Newman-Keuls. Comparisons presented in this paper between Centric and the individual standards were averaged from all trials that evaluated both Centric and the standard being compared.

Results and Discussion

Centric versus Provado

Centric 0.047 Lb ai/A was compared to Provado 0.047 Lb ai/A in a total of nine trials (Figure 1). At 3 DAT the check had 536 aphids/10 leaves compared with 93 in the Centric treatment and 148 in the Provado treatment. At 3 DAT Centric resulted in significantly better control than Provado in two of the nine trials. Only five trials conducted evaluations at 7 DAT. At 7 DAT the check had 470 aphids/10 leaves compared to 24 with the Centric treatment and 88 with the Provado treatment. At 7 DAT Centric resulted in significantly better control than Provado in one of the five trials. One trial conducted an evaluation at 12 DAT. At 12 DAT the check had 357 aphids/10 leaves compared with 10 in the Centric treatment and 95 in the Provado treatment. No significant differences were observed between Centric and Provado at 12 DAT.

Centric versus Furadan

Centric 0.047 Lb ai/A was compared to Furadan 0.25 Lb ai/A in a total of eight trials (Figure 2). At 3 DAT the check had 519 aphids/10 leaves compared with 72 in the Centric treatment and 28 in the Furadan treatment. At 3 DAT Furadan resulted in significantly better control than Centric in two of the eight trials. Evaluations at 7 DAT were conducted in seven trials. At 7 DAT the check had 435 aphids/10 leaves compared to 159 with the Centric treatment and 128 with the Furadan treatment. At 7 DAT no significant differences were observed between Centric and Furadan. One trial conducted an evaluation at 12 DAT. At 12 DAT the check had 357 aphids/10 leaves compared with 10 in the Centric treatment and 20 in the Furadan treatment. No significant differences were observed between Centric and Furadan at 12 DAT.

Centric versus Bidrin

Centric 0.047 Lb ai/A was compared to Bidrin 0.4-0.5 Lb ai/A in a total of 15 trials (Figure 3). At 3 DAT the check had 329 aphids/10 leaves compared with 45 in the Centric treatment and 139 in the Bidrin treatment. At 3 DAT Centric resulted in significantly better control than Bidrin in two of the 15 trials. Evaluations at 7 DAT were conducted in eight trials. At 7 DAT the check had 262 aphids/10 leaves compared to 14 with the Centric treatment and 187 with the Bidrin treatment. At 7 DAT Centric resulted in significantly better control than Bidrin in two of the eight trials.

Centric versus Assail

Centric 0.047 Lb ai/A was compared to Assail 0.05-0.056 Lb ai/A in a total of nine trials (Figure 4). At 3 DAT the check had 338 aphids/10 leaves compared with 25 in the Centric treatment and 16 in the Assail treatment. At 3 DAT no significant differences were observed between Centric and Assail. Evaluations at 7 DAT were conducted in five trials. At 7 DAT the check had 69 aphids/10 leaves compared to 4 with the Centric treatment and 3 with the Assail treatment. At 7 DAT no significant differences were observed between Centric and Assail.

Conclusions

Centric provided excellent control of cotton aphid in the 2001 cotton field trials as well as those of previous years. Additionally, Centric provides excellent control of fleahoppers, tarnished plant bugs, stinkbugs and whiteflies. Centric is highly systemic and has chemical properties, which allow it to rapidly penetrate plant tissue to provide a reservoir of active ingredient that gives long residual control of these leaf feeding pests. This results in minimal impact on non-target organisms and important beneficial insects that occur in cotton agro-eco systems. Therefore, Centric is well suited for use in cotton integrated pest management programs.

References

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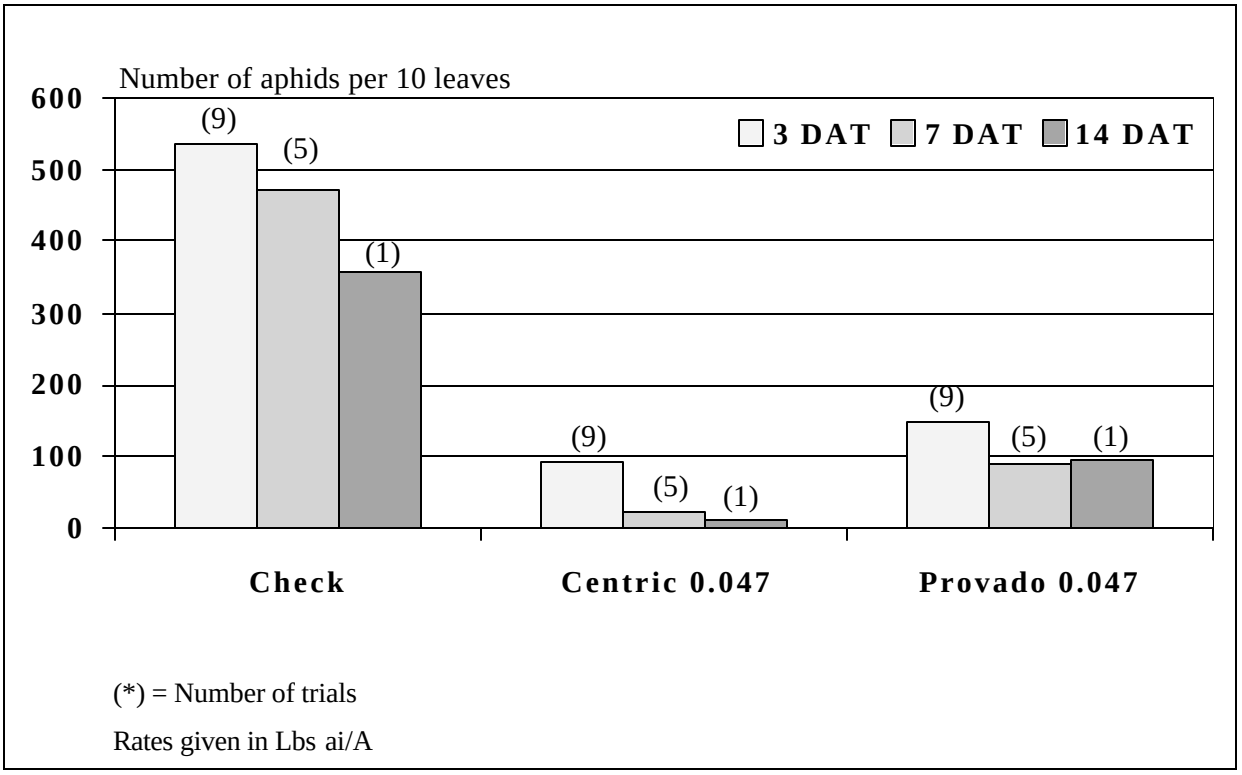

Figure 1. Efficacy of Centric compared to Provado for control of cotton aphid.

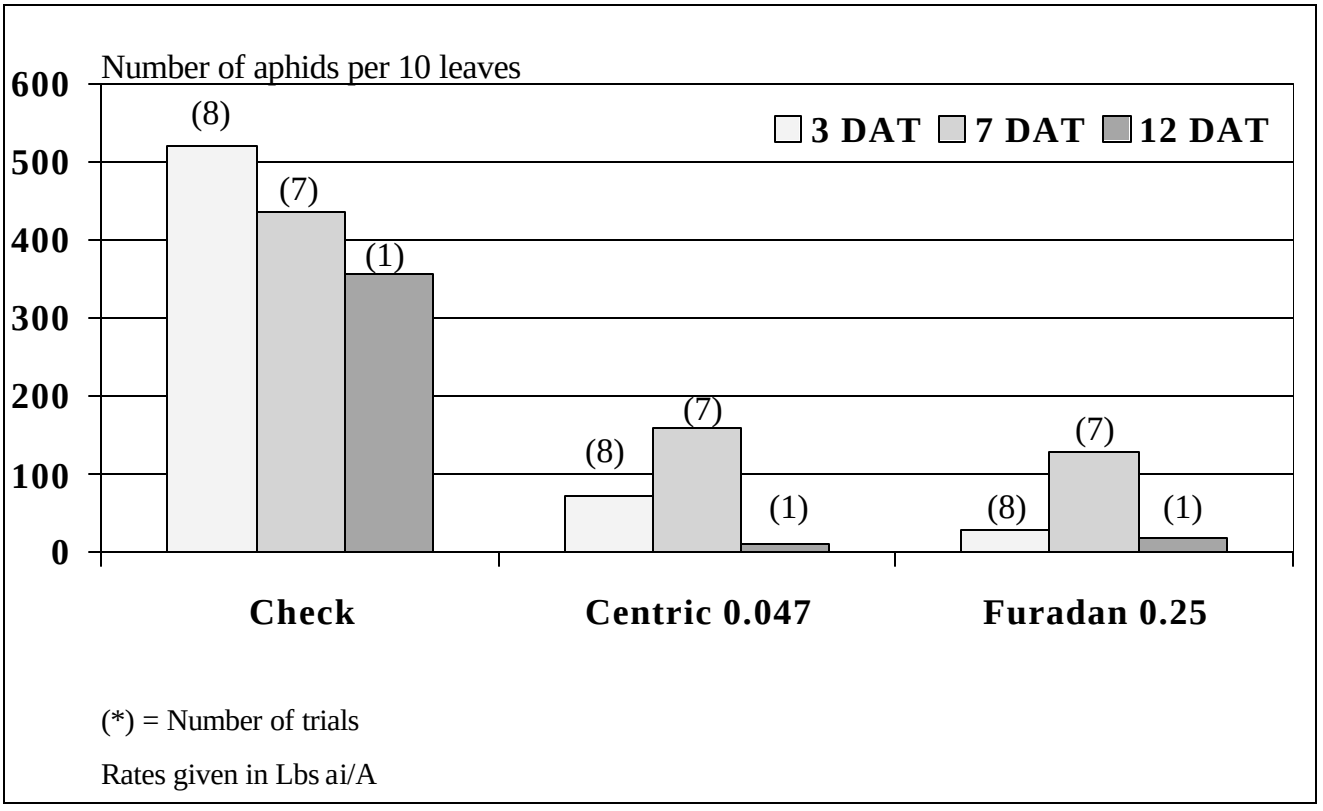

Figure 2. Efficacy of Centric compared to Furadan for control of cotton aphid.

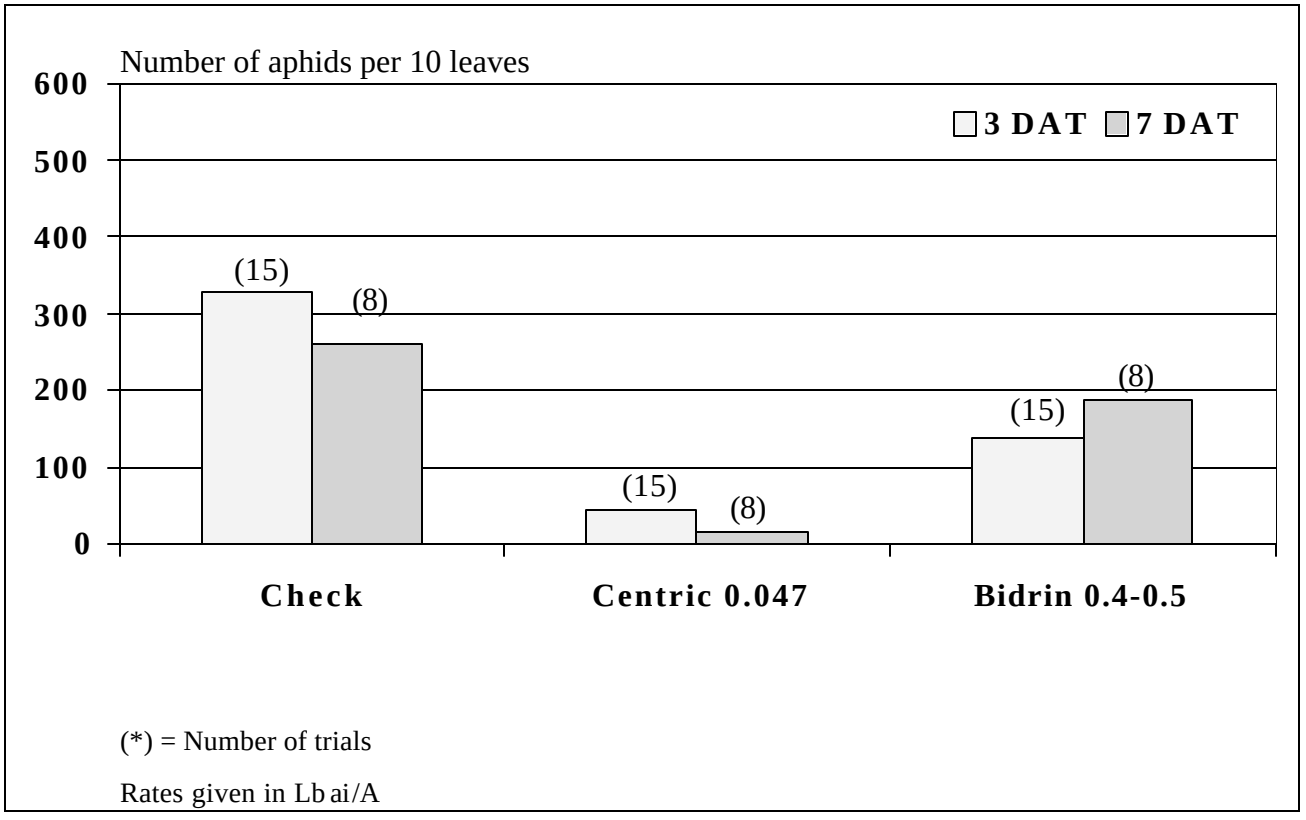

Figure 3. Efficacy of Centric compared to Bidrin for control of cotton aphid.

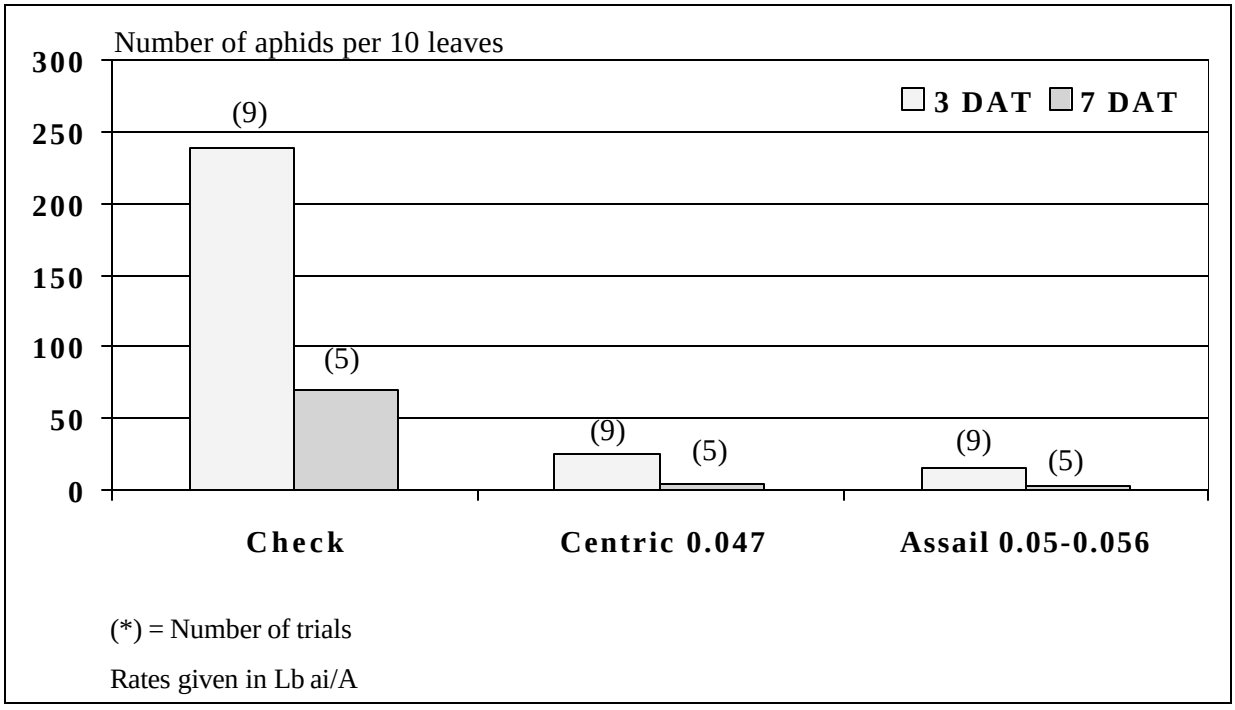

Figure 4. Efficacy of Centric compared to Assail for control of cotton aphid.