ALTERNATIVES TO NEONICOTINOIDS FOR CONTROL OF THRIPS IN COTTON

H. M. Chaney Jr.
G. M. Lorenz III
N.M. Taillon
W. A. Plummer
J. L. Black
A. J. Cato
University of Arkansas Cooperative Extension
Lonoke, AR

Abstract

Thrips are an early season pests in cotton that can delay maturity and cause yield loss. With the future of neonicotinoids uncertain and thrips tolerance/resistance to thiamethoxam (Crusier/Avicta) being found in Arkansas, there is a need to evaluate alternative products for thrips control. The objective of this study, conducted at Lon Mann Cotton Research Station, Marianna, Arkansas, was to evaluate other insecticide classes as a seed treatment or in-furrow treatment that might provide control of thrips. Results indicated that Orthene IST and IF, Verimark IF and Aldicarb IF applications are very effective for control of thrips.

Introduction

Thrips are an early season pest in cotton that can delay maturity and cause yield loss. Symptoms of thrips damage on young cotton are crinkled leaves, burnt edges, and a silvery appearance. The level of damage varies from year to year based on severity of the thrips infestation (Hopkins, et al., 2001). Thrips are considered to be the second most costly insect pest of cotton. In 2015, thrips infested 83% of cotton acreage causing a loss of 1,281 bales of cotton in Arkansas (Williams, et. al., 2015). In the last several years, insecticide resistance has developed in tobacco thrips (*Frankliniella fusca)*, the predominant species found in cotton. Herbert and Kennedy (2015) conducted studies in the Mid-South and Southeastern U. S. that indicated tolerance/resistance has developed to thiamethoxam (Cruiser/Avicta) and recent studies conducted in Arkansas have verified these findings (Plummer, et al., 2014). Insecticide seed treatments (IST) and additional foliar insecticide application(s) are often necessary to effectively control thrips creating high input costs for growers. In recent years neonicotinoids have come under scrutiny for their impact on pollinators (Krupke, et al., 2012). The pollinator concerns and control issues, would indicate the need to find alternative modes of action to control thrips.

Materials and Methods

Plot size was 12.5ft by 40ft in a randomized complete block design with 4 replications. Insecticide seed treatments (IST) included: Verimark (cyantraniliprole)13oz/cwt; Orthene (acephate) 15oz/cwt; and Aeris Seed Applied System (imidacloprid + thiodicarb) 33.27oz/cwt as the commercial neonicotinoid standard. In-furrow (IF) treatments included: Verimark 13oz/acre; Orthene 1lb/acre; Sivanto (flupyradifurone) 7oz/acre; and Aldicarb 3.5 and 5 lb/acre. All treatments, including the untreated check (UTC), were treated with a base fungicide package of Trilex Advanced 1.6 oz/cwt. Insecticide seed treatments were applied using a small batch treater, and IF applications were applied with an IF mounted sprayer system at 10 gal/acre set at 40 psi using Tee Jet 9001 VS flat fan nozzles for Sivanto, Orthene and Verimark while a planter mounted granular applicator was used for Aldicarb treatments. Plots were planted on May 6. Thrips samples were taken 18 and 26 days after planting (DAP) by collecting 5 plants per plot and placing in jars with 70% alcohol solution. Samples were washed and filtered in the lab at the Lonoke Agriculture Extension and Research Center, Lonoke, Ar. and thrips were counted using a dissection scope. Thrips damage ratings were taken at 20 and 28 DAP using the scale 0-5 where 0= no damage, and 5= plant loss. Data was processed using Agriculture Research Manager, Version 9 (Gylling Data Management, Inc., Brookings, S.D.). Analysis of variance was conducted and Duncan's New Multiple Range Test (P=0.10) to separate means.

Results and Discussion

At 18 DAP all treatments had fewer thrips than the UTC except Sivanto IF and Verimark IST; Aldicarb IF 5lb/acre had fewer thrips than Verimark IF, Aeris Seed Applied System IST, and Orthene IF (Figure 1). Thrips damage ratings taken at 20 DAP show all treatments had less damage than the UTC except Sivanto IF and Verimark IST; Aldicarb IF at both rates had less damage than Verimark IF and Orthene IF (Figure 2). Thrips counts 26 DAP show all treatments to be lower than the UTC except Sivanto IF and Verimark IST; Aldicarb IF 5lb/acre had fewer thrips than all other treatments; Aldicarb IF 3.5lb/acre had fewer thrips than both Verimark IF and Aeris Seed Applied System IST (Figure 3). At 28 DAP thrips damage ratings indicated all treatments except Sivanto IF with less damage than the UTC; Aldicarb at both rates and Aeris Seed Applied System IST had less damage than all other treatments; Orthene IF and IST, Aeris Seed Applied System IST, and Aldicarb 3.5 lb/acre had less damage than Verimark IF and IST, and Sivanto IF (Figure 4). Harvest showed Orthene IF and IST, Aeris Seed Applied System IST, Aldicarb IF 5 lb/acre, and Verimark IF had higher yield than the UTC (Figure 5).

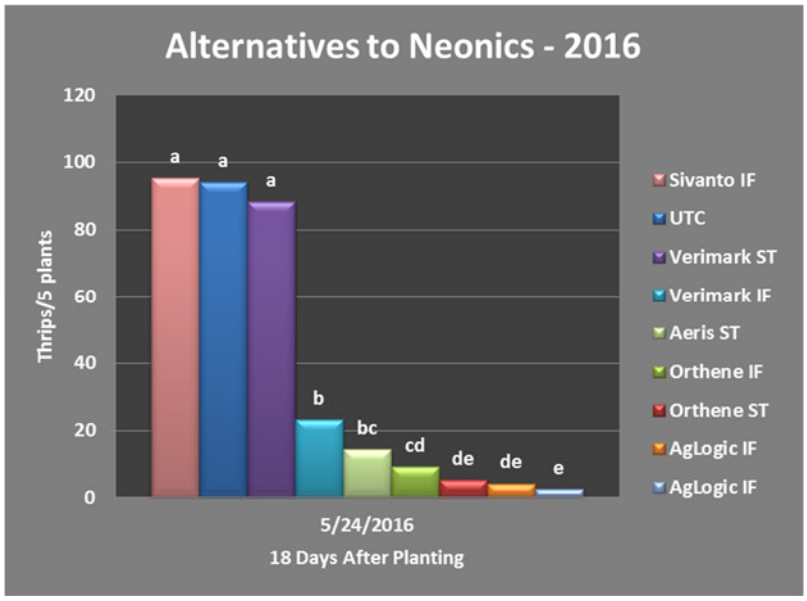

Figure 1: Thrips counts 18 Days after Planting

Data was processed using Agriculture Research Manager, Version 9 (Gylling Data Management, Inc., Brookings, S.D.). Analysis of variance was conducted and Duncan's New Multiple Range Test (P=0.10) to separate means.

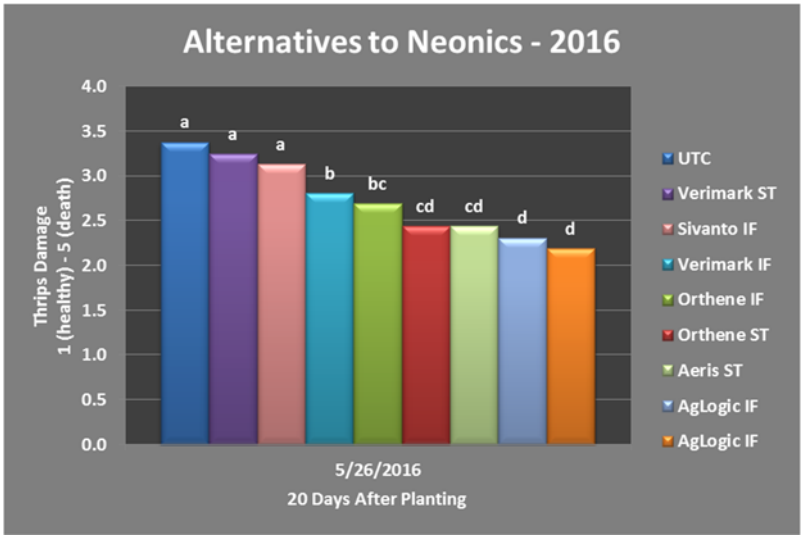

Figure 2: Thrips Damage Rating 20 Days After Planting

Data was processed using Agriculture Research Manager, Version 9 (Gylling Data Management, Inc., Brookings, S.D.). Analysis of variance was conducted and Duncan's New Multiple Range Test (P=0.10) to separate means.

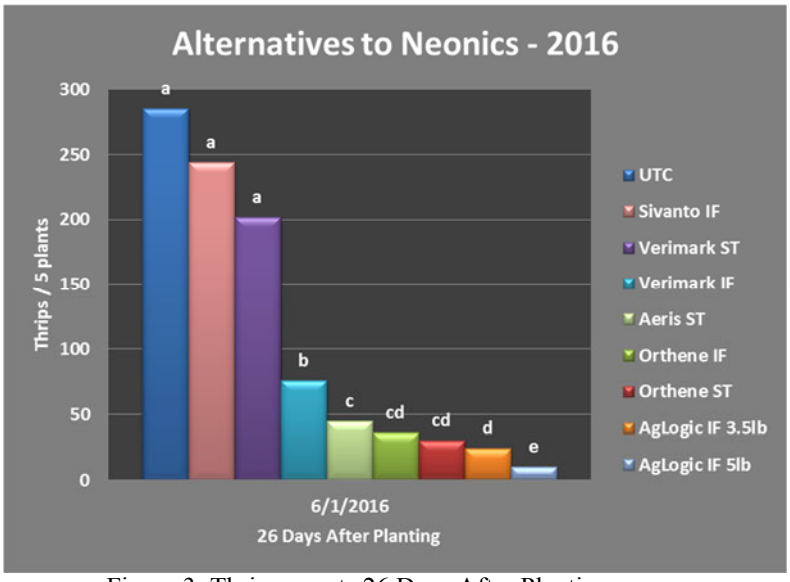

Figure 3: Thrips counts 26 Days After Planting

Data was processed using Agriculture Research Manager, Version 9 (Gylling Data Management, Inc., Brookings, S.D.). Analysis of variance was conducted and Duncan's New Multiple Range Test (P=0.10) to separate means.

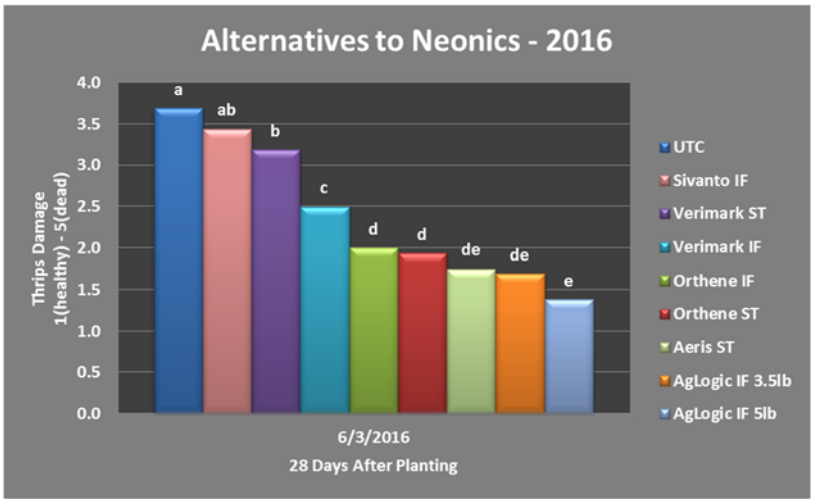

Figure 4: Thrips Damage Rating 28 Days After Planting

Data was processed using Agriculture Research Manager, Version 9 (Gylling Data Management, Inc., Brookings, S.D.). Analysis of variance was conducted and Duncan's New Multiple Range Test (P=0.10) to separate means.

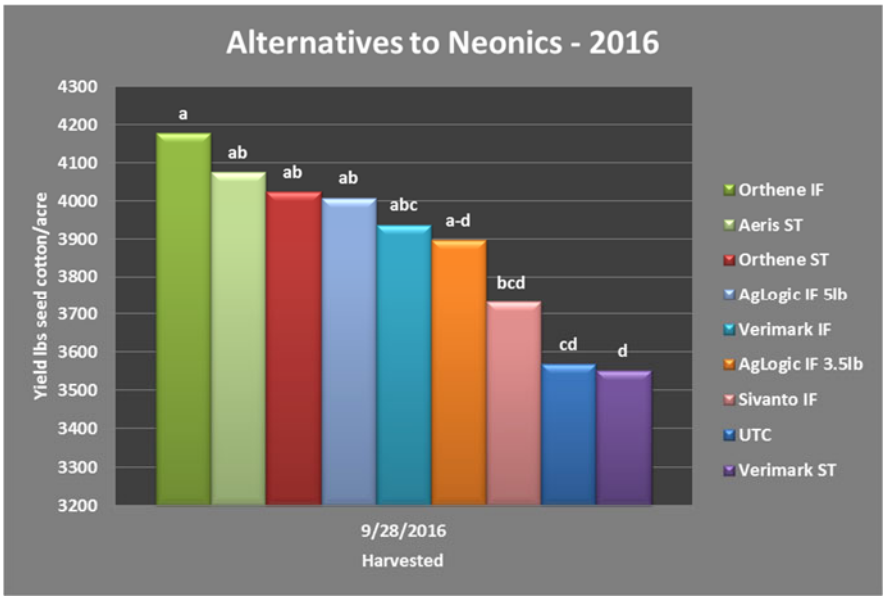

Figure 5: Yield

Data was processed using Agriculture Research Manager, Version 9 (Gylling Data Management, Inc., Brookings, S.D.). Analysis of variance was conducted and Duncan's New Multiple Range Test (P=0.10) to separate means.

Summary

Results indicate that Orthene IST and IF, Verimark IF and Aldicarb IF applications are very effective for control of thrips. Yield shows these treatments have comparable yield to Aeris Seed Applied System, the standard neonicotinoid. Use of these products will be driven by price of application, planting system, and market prices. More research needs to be done to help find new alternative insecticides to use to control thrips in cotton.

Acknowledgements

Appreciation is expressed to the Lon Mann Cotton Branch Experiment Station.

References

Herbert, A., Kennedy, G., (2015, February). New Survey Shows High Level and Widespread Resistance of Thrips to Neonicotinoid Insecticides [Web Log Post]. Retrieved from:

http://blogs.ext.vt.edu/ag-pest advisory/files/2015/NeonicThripsResistance.pdf

Hopkins, J. D., J.D Reaper, III, D.R. Johnson, G. M. Lorenz, III. 2001. Thrips Management in Arkansas Cotton. AAES Research Series 497. Pp 216-223.

Krupke CH, Hunt GJ, Eitzer BD, Andino G, Given K (2012) Multiple Routes of Pesticide Exposure for Honey Bees Living Near Agricultural Fields. PLoS ONE 7(1): e29268. doi:10.1371/journal.pone.0029268

Plummer W.A., G.M. Lorenz III, N.M. Taillon, H.M. Chaney, and B. C. Thrash. 2015. Control of Thrips with Insecticide Seed Treatments in Arkansas 2014. Summaries of Arkansas Cotton Research 2014. Pp 159-162

Williams, M.R., al. 2015. Cotton Insect Losses 2015. *In; Proceedings Beltwide Cotton Conference 201.*