THRIPS MANAGEMENT IN ALABAMA COTTON

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Abstract

Thrips management strategies were evaluated across Central and North Alabama. Nine at-plant treatments for cotton were evaluated at the Prattville Agricultural Research Unit and the Tennessee Valley Research Station in 2019 and 2020. Ratings for plant vigor, thrips damage, and yield were observed for each site-year to evaluate thrips resistance to systemic neonicotinoid seed treatments. Efficacy trials were performed on commercial in-furrow imidacloprid, acephate, and aldicarb formulations. Foliar applications of acephate, dicrotophos, spinetoram + methoxyfenozide, and pyrethroids were also evaluated for efficacy in the management of thrips.

Introduction

Cotton is a major crop of Alabama. In 2021, 60 of the 67 counties in Alabama produced cotton with a reported acreage of approximately 405,000. Alabama has the greatest distribution of cotton planted in the United States east of Texas. All of the cotton grown in Alabama receives some at-plant insecticide treatment with almost half of the acres receiving subsequent foliar applications throughout the growing season. Thrips are routinely one of the top three insect pests in cotton. Although Alabama has several species, Tobacco Thrips account for about 95% of our thrips populations (Wang, et al., 2018). Thrips have rasping and sucking mouthparts that extract the juices from seedling cotyledons and newly emerging leaves. This injury can lead to delayed maturity, plant deformation, and can cause significant reductions of yields.

The current management strategy in Alabama cotton is through the use of in-furrow seed treatments such as Gaucho (imidacloprid), Aeris (imidacloprid with the nematocide thiodicarb), AgLogic (aldicarb), Orthene (acephate), and Admire Pro (imidacloprid). Cruiser (thiamethoxam) was also used in the trial but is no longer recommended for thrips management due to resistance. Some common foliar applications are acephate, Radiant (spinetoram), Intrepid Edge (spinetoram with methoxyfenozide), Bifenthrin (pyrethroid), and Bidrin (dicrotofos).

Imidicloprid and thiamethoxam are both systemic neonicotinoids. Unfortunately over the past 5-7 years there has been evidence of growing resistance among thrips populations (Figure 1). As mentioned above, thiamethoxam resistance has grown to the point where it is no longer recommended for thrips management. The objectives of this study were to monitor resistance levels to neonicotinoids and assess the efficacy of alternative active ingredients in seed treatments and to evaluate the efficacy of common foliar insecticides for thrips management.

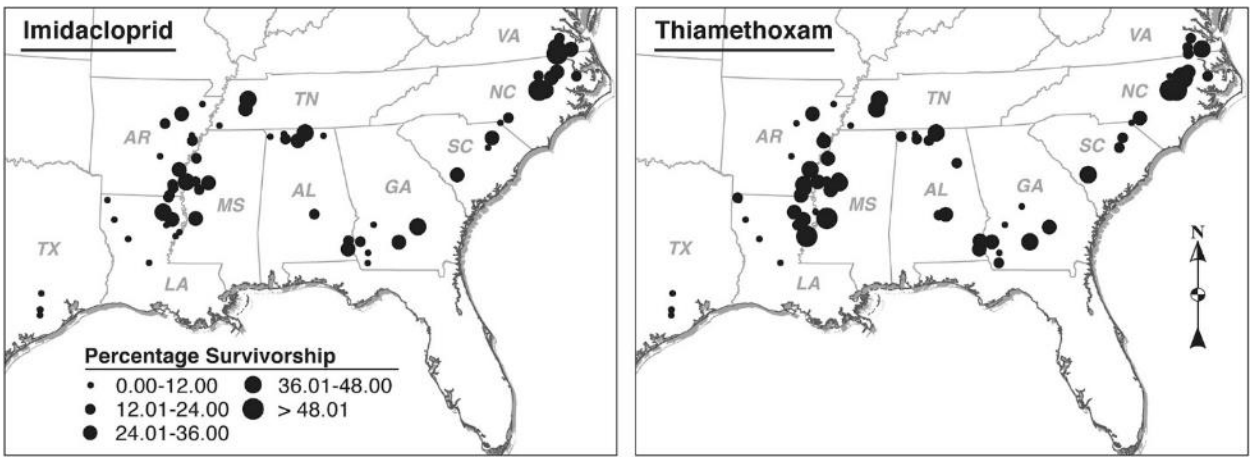

Figure 1. Map showing areas of resistance to imidacloprid and thiamethoxam in thrips population in the Southeast US

Methods and Results

Delta Pine 1646 cotton was planted at the Prattville Agricultural Research Unit (PARU) and the Tennessee Valley Research Station (TNV) in 2020-2021. The experimental design was a randomized complete block with 4 replications of each treatment. Plots were 4 rows wide and 25-30 feet long. Evaluation of thrips injury was made at the 2nd and 4th true leaf stage from a scale of zero to five, zero being no injury; 5 being plant death (Figure 4 and Figure 5). Stand counts of the center two rows were taken from each of the plots (data not shown). Plant vigor was assessed and rated on a scale of zero to ten, zero being no vigor; 10 being maximum vigor (Figure 2 and Figure 3). Yield was taken from the center two rows of each plot (Figure 6).

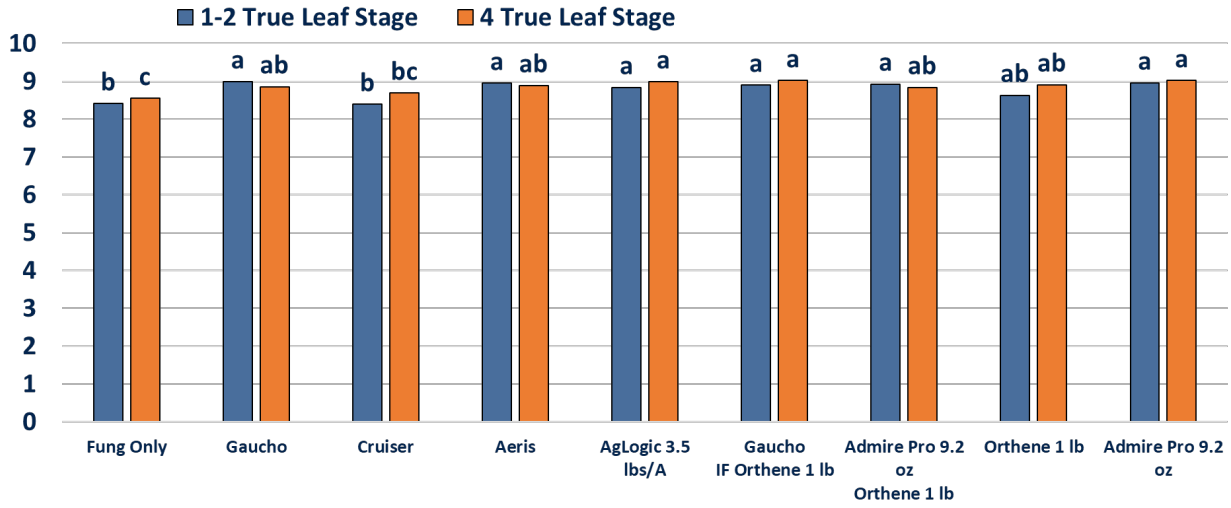

Figure 2. Graph of plant vigor at PARU. Bars with the same letter are not statistically different ($P < 0.05$)

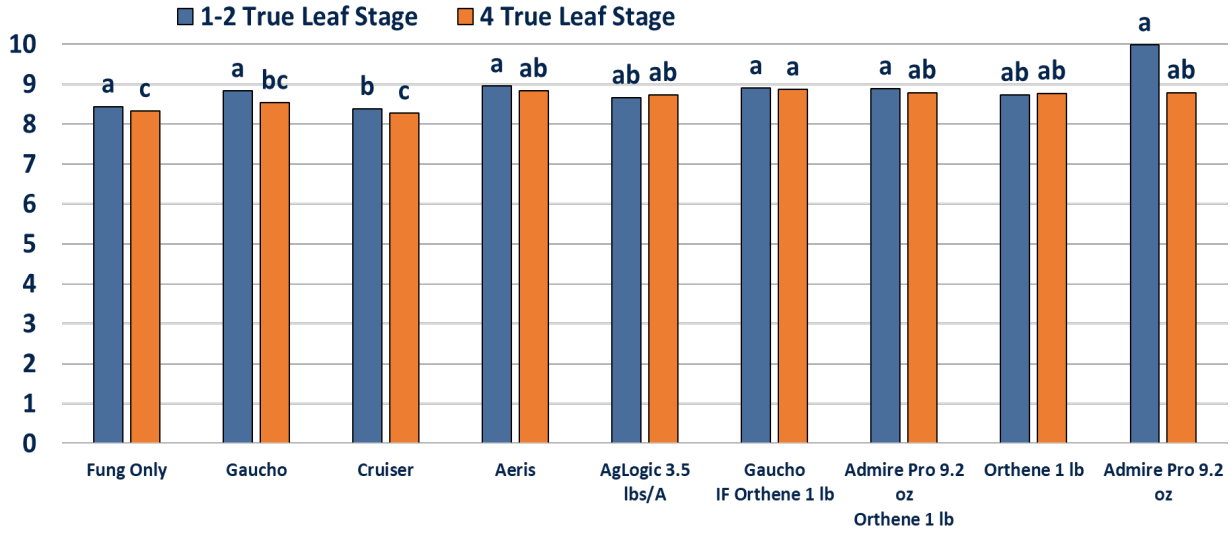

Figure 3. Graph of plant vigor at TNV. Bars with the same letter are not statistically different ($P < 0.05$)

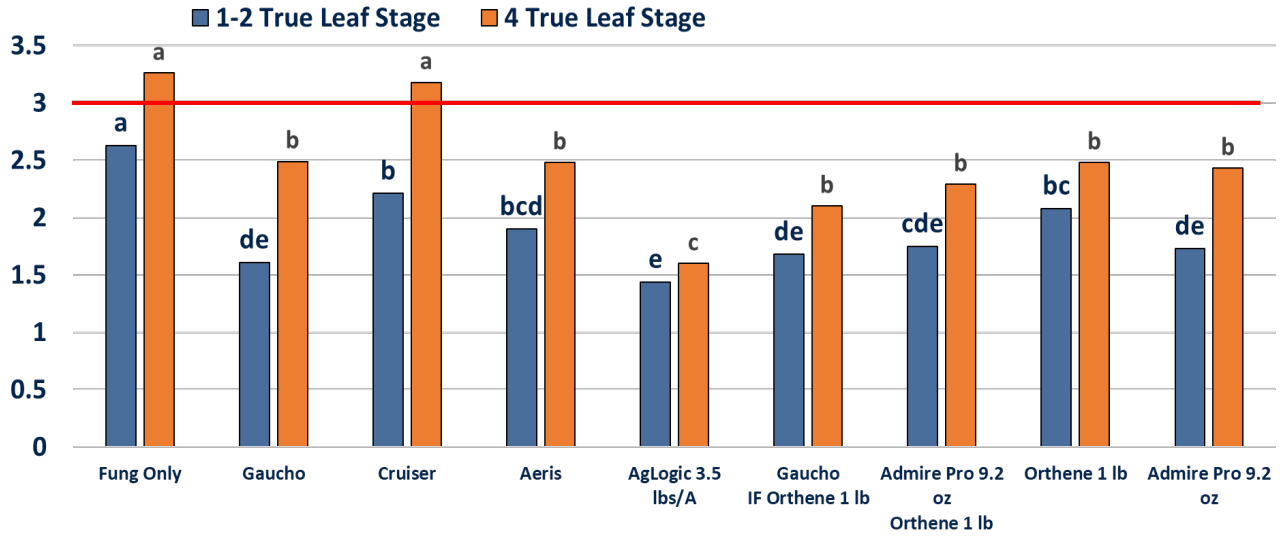

Figure 4. Graph of thrips injury at PARU. Red line indicates economic threshold. Bars with the same letter are not statistically different (P < 0.05)

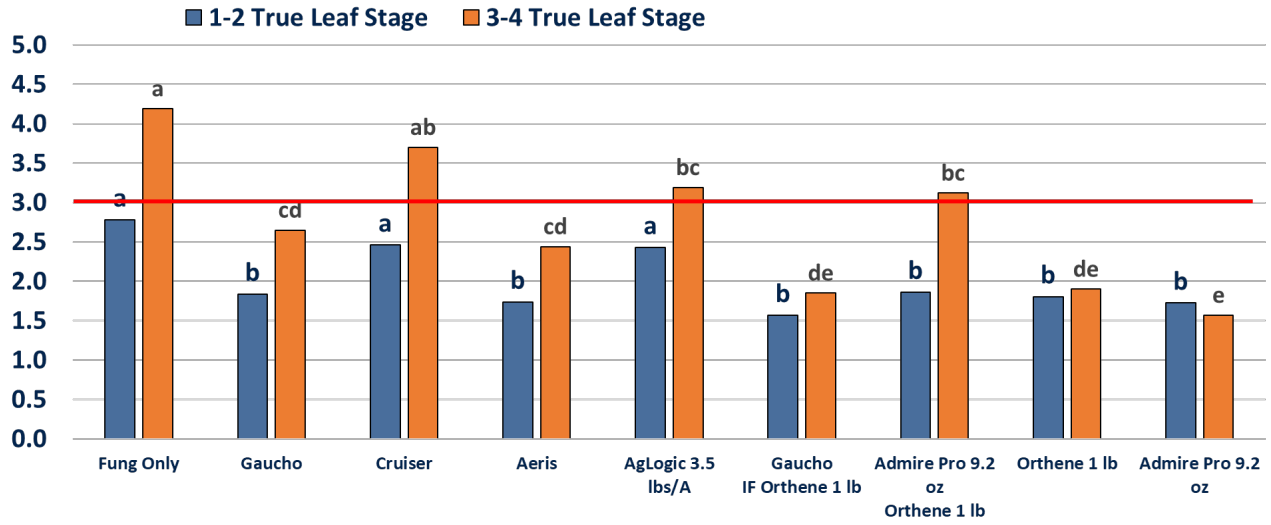

Figure 5. Graph of thrips injury at TNV. Red line indicates economic threshold. Bars with the same letter are not statistically different (P < 0.05)

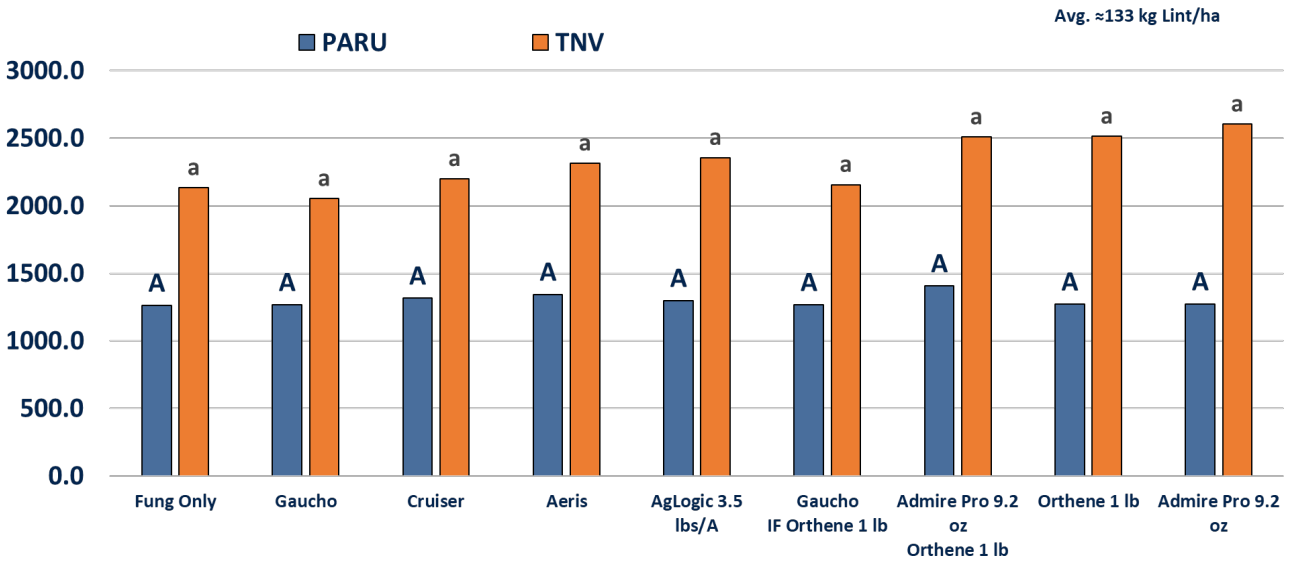

Figure 6. Graph of yield in kilograms per hectare for PARU and TNV. Bars with the same letter are not statistically different ($P < 0.05$)

Foliar applications were evaluated at a grower's field in Madison County, Alabama. The experimental design was a replicated strip trial with four replications. Plots were 4 rows wide and 100 feet long. Thrips injury assessments were made seven days after application which was approximately the 2nd true leaf stage. Five plants from each plot were washed in ethanol and the thrips were removed using a sieve in the laboratory. Counts were made using an observation microscope.

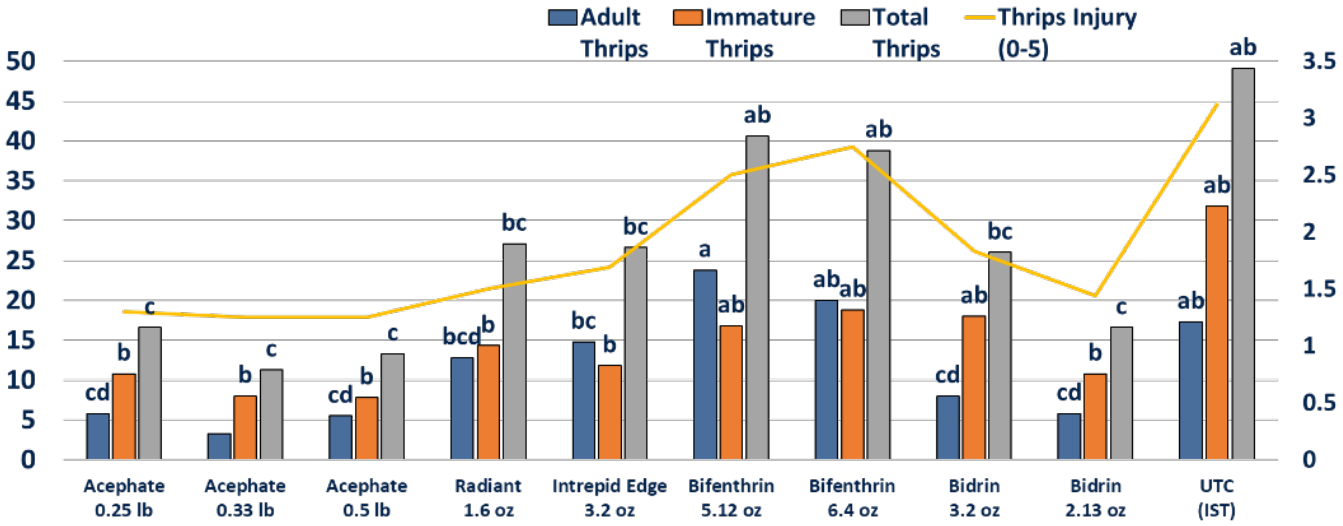

Figure 7. Graph of number of thrips found, their maturity, and thrips injury rating taken 7 DAA

Conclusions

Apart from Cruiser, which we do not recommend for thrips management, all at-plant treatments performed similarly at PARU and TNV. Even though resistance to imidacloprid has been documented, we still see adequate management from both seed treatments and in-furrow applications. The addition of acephate in-furrow did not seem add to management in imidacloprid treatments neither in-furrow nor seed treatments. Yield, although not significantly different statistically, still averaged 133 Kg of lint per hectare for plots treated plots (apart from Cruiser). For foliar

applications, there was no apparent rate response for applications of acephate or Bidrin. Bifenthrin did not provide much control compared to the untreated check. As resistance to imidacloprid increases over time, growers will have to change management strategies such as planting dates, proper foliar application timing, and different at-plant strategies such as AgLogic. Also, Bayer's new Thryv-On cotton has shown promise in thrips management.

References

Huseth, A. S., T. M. Chappell, K. Langdon, S. C. Morsello, S. Martin, J. K. Greene, A. Herbert, A. L. Jacobson, F. P. Reay-Jones, T. Reed, and D. D. Reisig. 2016. *Frankliniella fusca* resistance to neonicotinoid insecticides: an emerging challenge for cotton pest management in the eastern united states. Pest Management Science 72(10): 1934-1945

Wang, Hehe, G. G. Kennedy, F. P. F. Reay-Jones, D.D. Reisig, M.D. Toews, P. M. Roberts, D. A. Hebert, S. Taylor, A. L. Jacobson, and J. K. Greene. 2018. Molecular identification of thrips species infesting cotton in the southeastern united states. Journal of Economic Entomology 111(2): 892-898