IMPACT OF NITROGEN APPLICATION RATE ON TARNISHED PLANT BUG POPULATIONS, CONTROL, AND COTTON YIELD

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Abstract

The tarnished plant bug [*Lygus lineolaris* (Palisot de Beauvois)] is the primary insect pest of cotton in Mississippi, as well as most of the mid-southern growing region of the U.S. In 2012, 99% of the cotton (*Gossypium hirsutum* L.), acres planted in the Delta region of Mississippi were infested with tarnished plant bugs (Williams 2013). Nearly 95% of these acres received an average of six insecticide applications for tarnished plant bugs during the growing season. The average cost for a single tarnished plant bug application was $13.30 per acre in 2012. Increased inputs for control of a single pest as well as other input costs has led to greatly increased costs associated with cotton production.

Control of tarnished plant bugs in cotton has become more challenging due to insecticide resistance. Snodgrass and Scott (1988) documented tarnished plant bugs collected from the Mississippi Delta were more resistant to dimethoate than those collected from other areas of Mississippi. Snodgrass (1994) initially reported that tarnished plant bug populations in the Mississippi Delta were 54-fold more tolerant to permethrin and 35-fold more tolerant to bifenthrin than other populations from other areas of Mississippi. Later, these populations were documented to be resistant to the pyrethroid and OP class of insecticides (Snodgrass, 1996; Snodgrass et al., 2009).

It has been observed that tarnished plant bugs are attracted to vigorous growing cotton (Willers et al., 1999). Excessive N application to cotton can result in increased plant height as well as increased vegetative growth that can alter maturity (Varco et al., 1999). Given the status of tarnished plant bug resistance to insecticides and the cost required to control this pest, adjusting N rates could make cotton less attractive to tarnished plant bug and allow the crop to mature faster, while maintaining yield, resulting in economic benefits for many growers across the mid-southern growing region.

Experiments were conducted in 2012 and 2013 at the Delta Research and Extension Center located in Stoneville, Mississippi. Plots contained of sixteen – forty inch rows, which were seventy five feet long. All plots were replicated 4 times. Stoneville 5288 B2F was planted on 1 May 2012 and 14 May 2013. 32% UAN was side dressed at pinhead square at four application rates (lbs/acre) which included: 0 (untreated check), 40, 80, 120, and 160. For each nitrogen application rate as well as the untreated check, one set of plots were managed for tarnished plant bugs based on thresholds developed by the Mississippi State University Extension Service. An additional set of plots for each nitrogen rate as well as the untreated check were left untreated for tarnished plant bugs for comparison purposes. All plots were scouted weekly using appropriate methodology. In pre-blooming stages, 25 sweeps/plot were taken. Once treatment averaged 2 plant bugs per 25 sweeps applications were made. In blooming cotton, 2 drop cloth samples were taken per plot using a black drop cloth. Insecticide applications were made when treatment averaged 3 plant bugs per drop. All data were subjected to analysis of variance and means were separated using Fishers Protected LSD at $p = 0.05$.

Nitrogen application rate had a significant effect on the mean number of plant bugs present across each sampling

period. Significantly more plant bugs were present in the presence of N versus were N was not applied in the unsprayed portion of the test. Cotton yield was maximized in the sprayed portion of the test in plots receiving 80 lbs N/a. Results agree with findings from McConnell et. al., 2000, and Main et al., 2013. Generally, as N application rate increased, the number of applications made for plant bug management also increased. Plots receiving 120 and 160 lbs N/a received more applications across both years to manage plant bug populations. Mean profit was maximized in plots that were managed for plant bugs, when they received 80 lbs N/a. Less risk was also associated with plots receiving 80 lbs N/a when compared to plots receiving 120 and 160 lbs N/a. The least amount of risk was associated with plots receiving no nitrogen; however, they also had the least mean profit.

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