COTTON CULTIVAR SENSITIVITY TO COTTON FLEAHOPPER

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Abstract

Cotton fleahopper, *Pseudatomoscelis seriatus* (Reuter) (Hemiptera: Miridae), feeds on squares of cotton. It has reduced yield by up to 6% and also has delayed harvest in the southwest and mid-south (USA) cotton growing regions (Williams, 2000), including in south Texas where our studies were conducted. Variability in the relationship of cotton fleahopper-induced square loss to subsequent yield loss under similar cotton fleahopper feeding pressure occurs and presents a challenge to cotton fleahopper management (Ring et al., 1993; Brewer et al., 2012). Over three years in replicated field experiments in Corpus Christi and Port Lavaca, we monitored cotton fleahopper populations from early squaring through the first four weeks of bloom on several cotton cultivars grown in our region. We found variation in cotton fleahopper populations, percent open bolls near harvest, and yield across the cultivars. Selected cultivars appeared to be sensitive to cotton fleahopper populations as seen in early loss of squares which lead to a shift in bolls maturing late (lower percent open bolls near harvest). Overall yield potential was not affected, but delays in boll maturity may affect harvest timing. In contrast, some cultivars withstood cotton fleahopper pressure above the commonly recognized economic threshold without any detectable impact on boll maturity and yield. There was no firm relationship with observable cultivar traits such as leaf hairiness.

Introduction

Cotton fleahopper, *Pseudatomoscelis seriatus* (Reuter) (Hemiptera: Miridae), feeds on squares of cotton. It has reduced yield by up to 6% and also has delayed harvest in the southwest and mid-south (USA) cotton growing regions (Williams, 2000), including in south Texas where our studies were conducted. Variability in the relationship of cotton fleahopper-induced square loss to subsequent yield loss under similar cotton fleahopper feeding pressure occurs and presents a challenge to cotton fleahopper management (Ring et al., 1993; Brewer et al., 2012). Over three years in replicated field experiments in Corpus Christi and Port Lavaca, we monitored cotton fleahopper populations from early squaring through the first weeks of bloom on several cotton cultivars grown in our region, and measured square retention, boll maturity, and yield.

Materials and Methods

Over three years (2017-2019), we conducted replicated field experiments in Corpus Christi and Port Lavaca using several cotton cultivars grown in the region provided by the manufacturers (many thanks to Bayer Crop Science, PhytoGen, and Americot for several cultivars from each company). Eight cultivars were used in 2017 and 2018, and six in 2019. Plot size was at least four rows by 50 feet. The experiment was set out as a split plot, with cultivar as the main plot and the split plot with either full insecticide protection (Centric applied at labelled rates once or twice from first squaring through the first two weeks of bloom) or no insecticide. Measurements were cotton fleahopper populations from early squaring through the first four weeks of bloom (based on beat bucket sampling as recorded as fleahoppers per plant [Brewer et al. 2012]), % retention, boll load, % open bolls near harvest (Anderson et al. 2018), and yield (in 2019 yield was decomposed into yield from green bolls remaining at harvest (collected by hand and dried in oven) and open bolls machine (picker) harvested. Cotton samples were ginned using a 10-saw Continental Eagle laboratory gin.

Analysis of variance (ANOVA) implemented in the procedure Proc GLM for a split plot experimental design was used (Littell et al. 1991). Tukey's means separation test was conducted across cultivars separately in the insecticide treated and non-treated plots (Littell et al. 1991).

Results and Discussion

We focus on data from Port Lavaca in 2018 and Corpus Christi in 2019, where cotton fleahopper populations exceeded the regional threshold of 0.15 per plant during the first two weeks of bloom.

Results Summary from Port Lavaca in 2018: For most cultivars, cotton fleahopper exceeded 0.15 per plant during the first week of bloom and 0.30 per plant during the second week of bloom. Significant differences were detected that did not closely correspond to leaf hairiness information provided by the manufacturers. First position retention of squares was lower on several cultivars where high cotton fleahopper populations occurred, but some cultivars with high populations did not experience reduced retention. There were no overall boll load differences (the measure had high variability). But for boll maturity, percent open bolls near harvest tended to be lower where cotton fleahopper populations were high. As with the square retention measure, this trend was not consistent across all the cultivars, suggesting differences in cotton fleahopper sensitivity of the cultivars, even when populations exceeded twice the spray threshold during second week of bloom. Overall yield of two cultivars appeared depressed due to cotton fleahopper populations, but some cultivars with high cotton fleahopper populations had yields the same in the sprayed and unsprayed plots of each cultivar.

Results Summary from Corpus Christi in 2019: Cotton fleahopper exceeded 0.15 per plant during the first week of bloom for three cultivars of the six planted, and 0.30 per plant for five cultivars during the second week of bloom. Leaf hairiness was observed, with all cultivars classified as moderate hairy to hairy. First position retention of squares was lower from several cultivars where high cotton fleahopper populations occurred, but there were no differences in retention on second position bolls even though cotton fleahopper populations were above threshold for all cultivars from the second to fourth week of bloom. There were no overall boll load differences (the measure had high variability). For boll maturity, percent open bolls near harvest were greatly lowered where cotton fleahopper populations were high for some cultivars. But for two cultivars, retention and boll maturity were not affected when cotton fleahopper populations were high, suggesting differences in cotton fleahopper sensitivity of the cultivars. Overall yield (taken from the picker and from unopened bolls harvested by hand) of one cultivar appeared depressed due to cotton fleahopper populations. Four cultivars with high cotton fleahopper populations had substantial delay in maturity that affected harvest timeliness despite no depression in overall yield. For these four cultivars, there was 10 to 20% shift in yield taken from green bolls in the unsprayed plots compared to the sprayed plots.

Overall, cotton fleahopper and cultivar differences in sensitivity and boll maturity were detected and relevant to yield potential, but there was no clear pattern among cultivars from manufacturers or observable cotton traits like leaf hairiness. Some cultivars withstood cotton fleahopper pressure by compensating with new bolls, but there were boll maturity delays. The delay in maturity differed across the cultivars. Our data support that in growing areas where earliness is desirable (in South Texas to avoid August subtropical storms and adhere to boll weevil regulations on harvest) a cotton fleahopper threshold of 0.15 cotton fleahopper per plant using the beat bucket sampling method (Brewer et al. 2012) is justified, even though some cultivars appear to tolerate this feeding pressure. Our initial hope was to consider adjusting thresholds based on an observable cotton trait such as leaf hairiness, but there was no distinct relationship. The differences in cotton sensitivity to cotton leafhopper were apparent and affected yield potential primarily by boll maturity delays, but any underlying reason for the cultivar differences remains to be seen.

Acknowledgments

Special thanks to Research employees in Corpus Christi and Extension employees at Port Lavaca who assisted in data collection. Thanks to Cotton Inc. for support of our continuing work on square and boll-feeding sucking bugs.

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