COTTON YIELD RESPONSE TO SIMULATED COTTON FLEAHOPPER AND WESTERN TARNISHED PLANT BUG INFESTATIONS AS INFLUENCED BY IRRIGATION

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Abstract

Effect of manual removal of early versus late-stage fruits was evaluated on two cotton cultivars as influenced by water level. Experimental design consisted of three fruit abscission treatments (removal of 100% squares prior to the initiation of flowering to mimic cotton fleahopper infestation, 20% bolls removed from the top 1/3rd of the plant canopy at crop cut-out to mimic late season *Lygus* infestation, and control), two water levels (high versus low), and two cultivars (PHY 350 W3FE versus ST 4946 GLB2), replicated three times and deployed in a randomized complete block design (total 36 plots). Significantly higher lint yield was recorded from 'High' water regime (730 lb/acre) compared to that in 'Low' water regime (490 lb/acre). No significant difference in lint yield was recorded between fleahopper simulated treatments and control plots regardless of the water regime. Square removal did not result in significant differences in lint yield between cotton variety PHY 350 W3FE (471 and 683 lb/A) and ST 4946 GLB2 (509 and 779 lb/A) in low and high water, respectively. Lint yield did not significantly vary between 20% late-season fruit loss via manual pruning and control plots, but the yield penalty of 20% late fruit loss was more prominent in low water treatment than in high water regime. Early-season square removal resulted in increased micronaire values at both irrigation regimes, reaching to the discount range under high water regime. The effect of late-season simulated *Lygus*-induced fruit removal did not significantly influence the lint micronaire. The increased irrigation water level (high water regime) increased micronaire values in both cotton cultivars, but PHY 350 W3FE had micronaire in the premium range at both irrigation levels while the micronaire values in ST 4946 GLB2 increased to move away from the premium range to the base range.

Introduction

Cotton fleahopper and Lygus appear to be an emerging concern to the Texas High Plains growers in recent years. Several suitable host plants that support overwintering of these plant bug species exist in the Texas High Plains. The shift in cotton production system from 60:40% irrigated: dryland to 40:60% in the last two decades has altered how we grow cotton. This shift from irrigated to dryland farming warranted to manage cotton pests effectively to increase profitability. Plant bugs have a general inclination to attack the stressed plants and cause significant damage. Cotton plant responses to cotton fleahopper and Lygus injury under a range of irrigation regimes remain uninvestigated. The overall goal of this study was to characterize the effects of simulated cotton fleahopper and western tarnished plant bug on cotton lint yield and fiber quality in relation to available irrigation water levels.

Materials and Methods

Effect of manual removal of early-stage fruits versus control was evaluated on two cotton cultivars, PHY 350 W3FE and ST 4946 GLB2, as influenced by irrigation water level. Experimental design consisted of three fruit abscission treatments (removal of 100% squares prior to the initiation of flowering to mimic cotton fleahopper infestation, 20% bolls removed from the top 1/3rd of the plant canopy at crop cut-out to mimic late season Lygus infestation, and control), two water levels (high versus low), and two cultivars (PHY 350 W3FE versus ST 4946 GLB2), replicated three times and deployed in a randomized complete block design (total 36 plots). The experimental unit of each fruit abscission treatment was a 10-ft section of a uniform cotton row flagged in the middle of a 4-row x 300-ft plot. Square abscission treatments, 1) control (zero square removal) and 2) manual removal of 100% squares, were deployed when cotton was highly vulnerable to fleahopper injury (2-3 weeks into cotton squaring). The test plots were monitored for the occurrence of any other insects, but no such occurrences were observed throughout the growing season. At crop cut-out, 20% bolls from the top of cotton plants were removed from *Lygus* injury simulated plots.

Results and Discussion

Simulation of cotton fleahopper infestations. Combined over two cultivars, significantly higher lint yield was recorded from 'high' water regime (730 lb/acre) compared to that in 'low' water regime (490 lb/acre) (Fig. 1). No significant difference in lint yield was recorded between fleahopper simulated treatments and control plots regardless of the water regime (Fig. 1). Square removal did not result in significant differences in lint yield between cotton variety PHY 350 W3FE (471 and 683 lb/A) and ST 4946 GLB2 (509 and 779 lb/A) in low and high water, respectively.

Simulation of late-season boll abortion. Lint yield did not significantly vary between 20% late-season fruit loss via manual pruning and control plots, but the yield penalty of 20% late fruit loss was more prominent in low water treatment than in high water regime (Fig. 2). Also, PHY 350 WFE was more susceptible to late-season fruit loss than ST 4946 GLB2 (Fig. 2). Both in 'low' and 'high' water regimes, significantly higher micronaire was recorded between fleahopper simulated treatments and control plots; however, no significant differences in micronaire were detected between *Lygus* simulated treatments and control plots both in 'low' and 'high' water regimes.

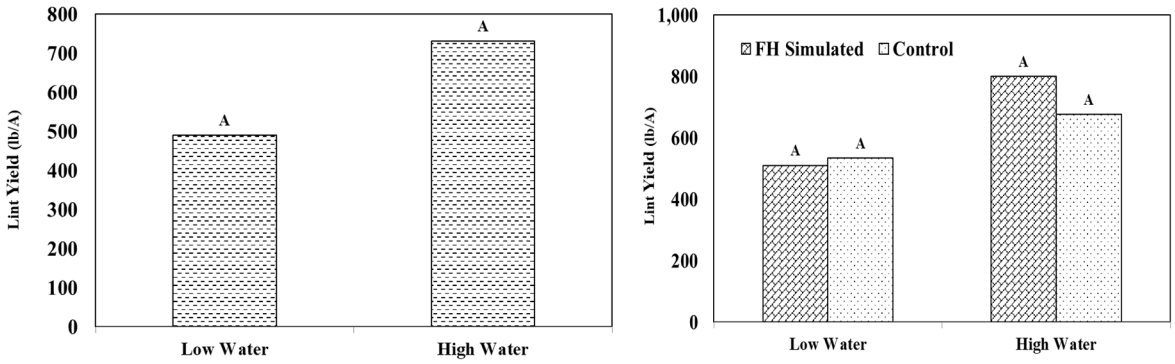

Figure 1. Average lint yield under high and low water regimes (left) and the yield following manual removal of 100% squares prior to first flower versus control plots, Lamesa, Texas, 2019.

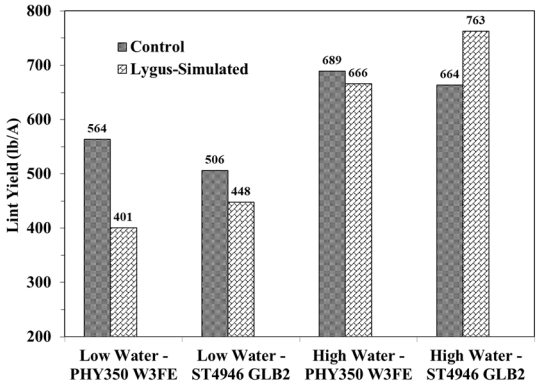

Figure 2. Average lint yield influenced by simulated *Lygus*-induced fruit removal in late season in two cotton varieties under high and low water regimes, Lamesa, Texas, 2019. Average values were not statistically significant due to high variation in data.

Averaged over two cotton cultivars, early-season square removal resulted in increased micronaire values at both irrigation regimes, reaching to the discount range under high water regime. The effect of late-season simulated *Lygus*-induced fruit removal did not significantly influence the lint micronaire. The increased irrigation water level (high water regime) increased micronaire values in both cotton cultivars, but PHY 350 W3FE had micronaire in the premium range at both irrigation levels while the micronaire values in ST 4946 GLB2 increased to move away from the premium range to the base range (Fig. 3).

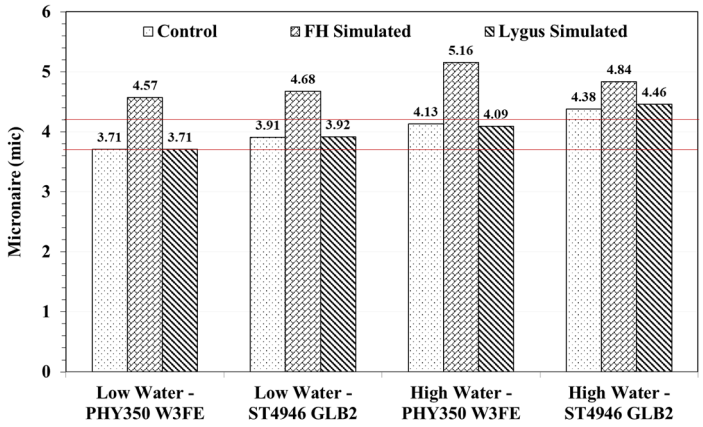

Figure 3. Average micronaire values influenced by simulated early-season cotton fleahopper damage and late-season *Lygus*-induced fruit removal in two cotton cultivars under high and low irrigation regimes, Lamesa, Texas, 2019. The area enclosed by two red lines (3.7-4.2) indicates the micronaire values for premium quality cotton lint.

Acknowledgments

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