EVALUATING FALL ARMYWORM THRESHOLDS IN WHORL STAGE CORN

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Abstract

The current fall armyworm threshold in whorl stage corn for the state of Mississippi is one or more larvae per plant from emergence to mid-whorl stage or 100% infestation. The objective of this study was to evaluate and refine current defoliation thresholds in whorl stage corn. Manual defoliation and larval infestations of neonates were used in this study. Both treatments were conducted at the V5 and V10 vegetative growth stages. Manual damage at the V5 growth stage did not cause yield loss, but manual damage at V10 growth stage had a significant effect on yield at the 100% level. Infestation of fall armyworms did not result in significant yield loss at any level. This may be because the armyworms did not cause significant damage in these studies. More data are needed to refine and quantify yield losses from defoliation in whorl stage corn.

Introduction

In the state of Mississippi, the current fall armyworm threshold for whorl stage corn is one or more larvae per plant from emergence to mid-whorl stage or 100% infestation. This has been the threshold for corn in the state of Mississippi for many years and with increased yields it is necessary to refine thresholds under current production practices. Tests were conducted to determine the impact of damage from larval infestations and from simulated larval damage (manual tissue removal on yield at two vegetative growth stages).

Materials and Methods

During the summer of 2016, this experiment was conducted at two locations in Mississippi. One was at the Delta Research and Extension Center in Stoneville, MS and the other was at the R.R. Foil Research and Extension Center in Starkville, MS. The plant population was different for each location. In Stoneville, MS there was a plant population of 34,000 plants per acre on irrigated plots and for Starkville, MS there was a plant population of 31,000 plants per acre on non-irrigated plots. The plot dimensions for both locations were four row plots with a row length of 10 feet and a row width of 38 inches. Treatments were arranged in a randomized complete block design with four replications. Data were analyzed using PROC GLIMMIX (SAS 9.4).

Two individual experiments were conducted at each location. One of these experiments evaluated manual damage to the corn plant to simulate fall armyworm feeding. The other was infesting fall armyworm neonates to individual plants. Both the simulated damage and the infestations were conducted at the V5 and V10 growth stage. Each test contained 5 treatments. Treatments included: an untreated control, 25%, 50%, 75%, and 100%. The percentages were the amount of plants that were infested or manually damaged compared to the total number of plants on the center two yield rows of each plot. For the manually damaged plants, a pair of garden scissors were used to remove all plant tissue at and above the uppermost visible leaf collar of the corn plant. For the fall armyworm infested plants, an insect inoculator or Bazooka was used (Davis and Oswalt 1979). This device is designed to drop 15-20 fall armyworm neonates down into the whorl of the designated plant. Neonates were gently mixed with corn cob grit and calibrated to deliver approximately 20 per whorl. The corn cob grit was then used in the insect inoculator device and dropped down into the whorl of each plant. Damage ratings were taken on each plot when larvae left the plant to pupate. The rating scale is described in Davis et al. (1992). This scale had a range of 0-9 with 0 being no damage and 9 signifying complete destruction of the whorl. All plants in each plot were individually rated including those that were not infested. At the end of the growing season, all plots were mechanically harvested in both the manually damaged and fall armyworm infested plots with a small plot combine.

Results and Discussion

There was no significant yield loss observed when manual damage was imposed at the V5 growth stage (Figure 1). At the V10 growth stage, plots in which 25, 75, or 100% of plants were damaged yielded significantly less than plots in which no plants were damaged (Figure 2). There were no differences in yield from fall armyworm infestations at either the V5 or V10 growth stages (Figures 3 and 4). In these studies, larval infestations only resulted in moderate levels of damage based on the Davis et al. (1992) rating scale (data not shown). This may have contributed to the lack of yield response. The fall armyworm colony available for these studies had been in laboratory culture for a number of generations and may have resulted in the lack of severe feeding damage observed in the field studies.

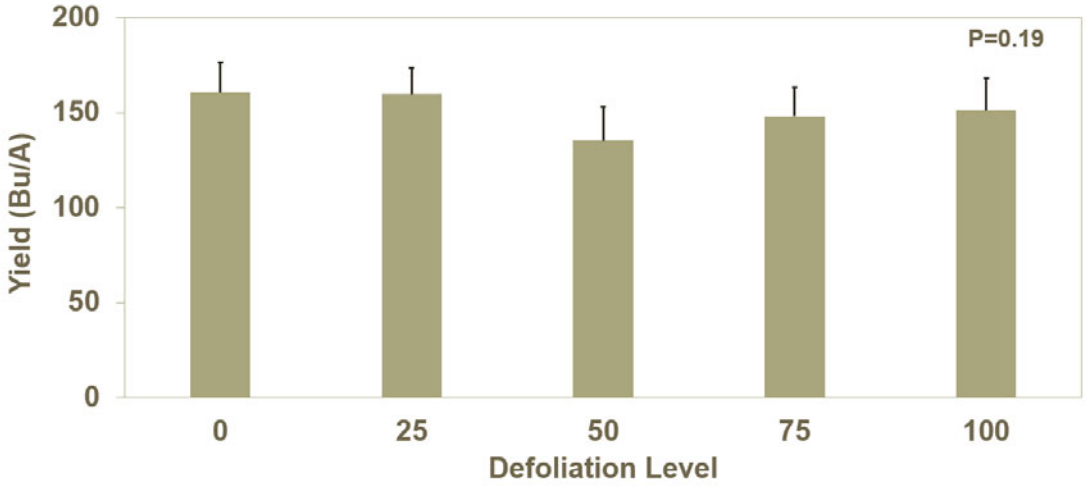

Figure 1. Impact of plant tissue removal at the V5 growth stage on field corn yield.

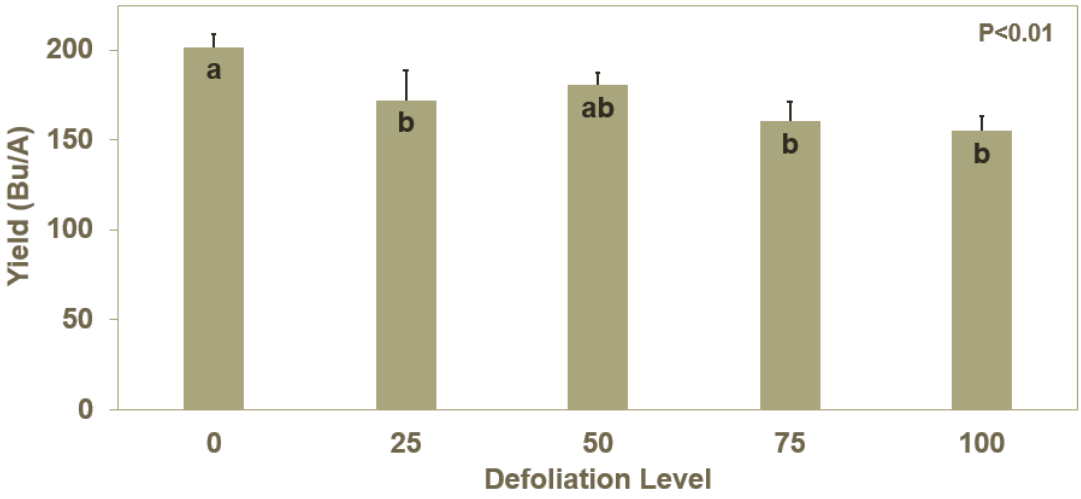

Figure 2. Impact of plant tissue removal at the V10 growth stage on field corn yield.

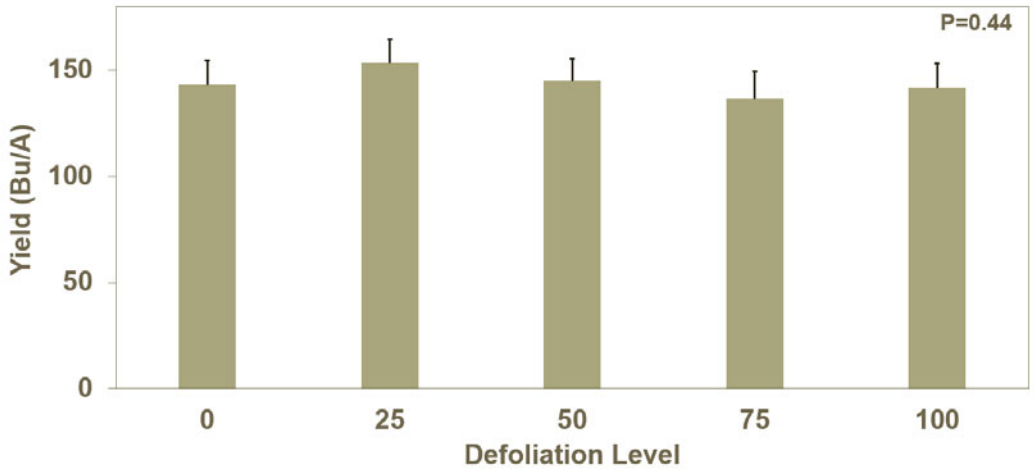

Figure 3. Impact of FAW infestations at the V5 growth stage on field corn yield**.**

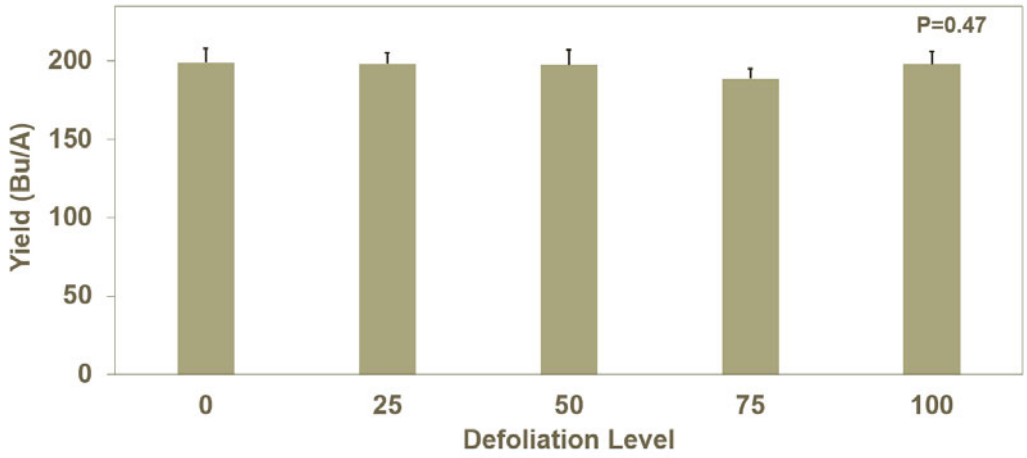

Figure 4. Impact of FAW infestations at the V10 growth stage on field corn yield

Summary

Only the V10 simulated defoliation caused significant yield loss when levels were 50% or higher. Infestations of neonate fall armyworms did not result in yield loss at any level. Infestations of neonates only resulted in moderate levels of damage based on the Davis et al. (1992) rating scale, which may have contributed to the lack of yield response. The fall armyworm colony available for these studies had been in laboratory culture for a number of generations which may have resulted in the lack of severe feeding damage observed in the field studies. Results from the manual tissue removal studies at the V10 growth stage indicate that leaf and whorl tissue damage during the vegetative stages can result in yield loss. The studies reported here will be repeated during 2017, and additional studies to determine the vegetative growth stage(s) that are most sensitive to damage will also be conducted.

Acknowledgements

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References

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