EFFECTS OF STINK BUG (*EUSCHISTUS SERVUS*) DAMAGE ON EARLY VEGETATIVE STAGE CORN AND YIELD LOSS

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Abstract

Studies were performed to evaluate the yield loss potential of brown stink bug feeding on early vegetative stage field corn. Brown stink bug is a sporadic pest of corn in Mississippi. However during 2017, a substantial number of corn fields experienced infestations and subsequent damage. Two studies were conducted in commercial fields to determine the potential damage of this pest. A paired-plant experiment to examine the impact of stink bug damage, at varying severities, on yield. The intensity of damage was categorized using visual symptomology, including characteristic holes lining leaves, holes in leaves and plant stunting, and tiller formation/whorl-death. With each increase in damage severity a significant reduction in yield was observed. Another experiment examined the impact of the occurrence of stink bug damage (varying percentage of damaged plants, 0-40%) on yield. The experimental unit for this study was 10 feet of one row, so yields could be converted to bushels per acre. The severity of stink bug damage for individual plants was not determined. All levels of stink bug damaged plants significantly reduced yield compared to the non-damaged control, with e20% damaged plants resulting in significantly higher yield loss than 10% of plants with stink bug damage.

Introduction

Brown stink bugs, *Euschistus servus* (Say), are polyphagous, bivoltine insects that commonly feeds on grasses, shrubs, trees, and cultivated crops (McPherson 1982, McPherson and McPherson 2000). It has been noted to feed on cultivated crops like soybean (*Glycine max*), corn (*Zea mays*), alfalfa (*Medicago sativa*), cotton (*Gossypium hirsutum*), pecan (*Carya illinoinensis*), sorghum (*Sorghum bicolor*), pear (*Pyrus* spp.), apple (*Malus* spp.), tomato (*Solanum lycopersicum*), sugar beets (*Beta vulgaris*), and tobacco (*Nicotiana tabacum*) (McPherson and McPherson 2000). Adults and nymphs have piercing-sucking mouthparts to puncture plant tissue, and they can attack all plant parts like stems, petioles, foliage, flowers, and fruits/seeds (McPherson et al. 1994, McPherson and McPherson 2000). The first generation typically occurs on wild hosts, while the second generation is on cultivated crops (Ehler 2000). Since corn is the first cultivated crop to be planted in the spring of most years, it is usually the only cultivated host present when brown stink bug leaves winter/spring wild hosts (Bergman 1999). Brown stink bugs are problematic at two stages in corn. The first being seedling corn, and the second is prior to ear emergence. A unique symptomology characteristic is the elongated holes with the chlorotic edges, and this occurs when a brown stink bug feeds at the base of a plant on the unfolded whorl. As the corn plant's whorl unfolds, it will show the symptomology. Adults and nymphs can both damage corn plants and inject a digestive enzyme that causes leaf destruction, plant stunting, tillering, and "dead-heart" (Townsend and Sedlacek 1986, Sedlacek and Townsend 1988, Apriyanto et al. 1989a, Apriyanto et al. 1989b, McPherson and McPherson 2000, Catchot et al. 2018). Injury from brown stink bugs is often more severe when partially open seed slots allow the bugs to reach the growing points (Bergman 1999). For Mississippi, they can typically be seen from March until September depending on weather conditions. They become active during the first warm days of spring when temperatures rise above 21°C.

Materials and Methods

Studies were conducted during 2018 in four commercial fields across the Mississippi Delta to determine the yield loss potential of brown stink bugs in corn. Fifty paired plants and twenty 10' sections (these would allow for yield to be converted to a per acre basis) were marked at each location. The plants were flagged for observation between 8 May and 14 May, and a completely randomized design was used at all locations. Plant damage for the paired plant experiment was rated on a 0-3 scale with 0 representing no visible damage, 1 representing the characteristic holes in a line across the leaf, 2 representing line(s) of holes across leaves with plant stunting, and 3 representing "dead heart" (whorl death and tiller formation) or plant death. Each pair of plants consisted of a damaged plant that was given a damage rating based on visible symptomology and an adjacent non-damaged plant. A varying number of each damage class was observed from each location. For the twenty 10' sections at each location, five sections of row representing each damage level (0%, 10%, 20%, 30%, or 40% of plants with stink bug damage) were marked for observation. A ten foot pipe was laid next to a row of plants, and the total number of plants was counted. Then the damaged plants were counted out of the total plant count to get a damage percentage that was represented by a certain color flag. I proceeded through the field until I found 5 of each percentage of damaged plants.

When grain had reached maturity, both experiments were hand harvested. Grain from each sample was weighed and moisture was determined. Grain moistures were corrected to 15%. For the paired plants, the yield results were compared within each damage rating class across all fields. For the ten foot sections, damage severity for individual plants within a section was not determined. Data were subjected to GLIMMIX procedures, with means separated according to Fisher's Protected LSD.

Results

Plant damage with leaf puncture symptomology resulted in a significant yield reduction compared to the non-damaged control (Figure 1). As damage severity increased, additional significant yield reductions were observed. Some plants with damage symptoms of tillering/dead-heart did not produce any yield. For the 10 row feet sections trials, all levels of damaged plants resulted in significantly lower yields than the non-damaged control (Figure 2). Stink bug damage to 10% of plants resulted in a 9.1% yield reduction. Damage to e 20% of plants resulted in a ca. 17% yield reduction.

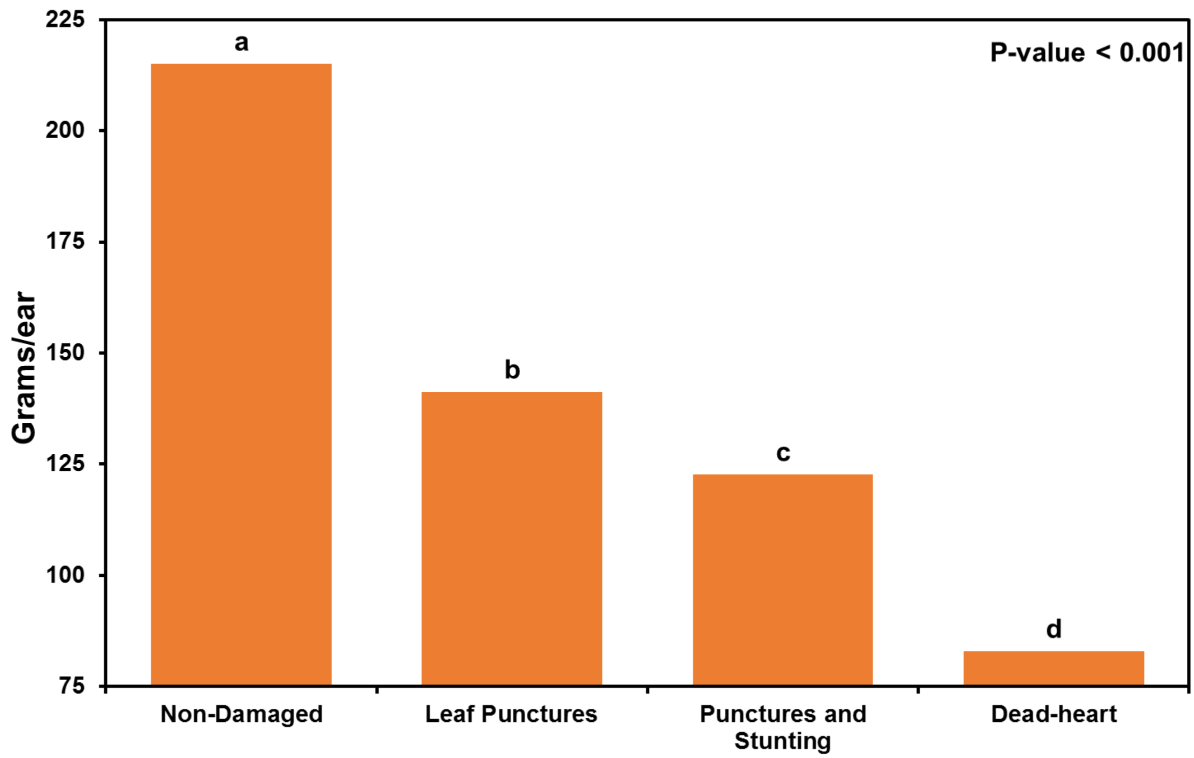

Figure 1. Impact of natural infestation damage on field corn yield (Paired plants).

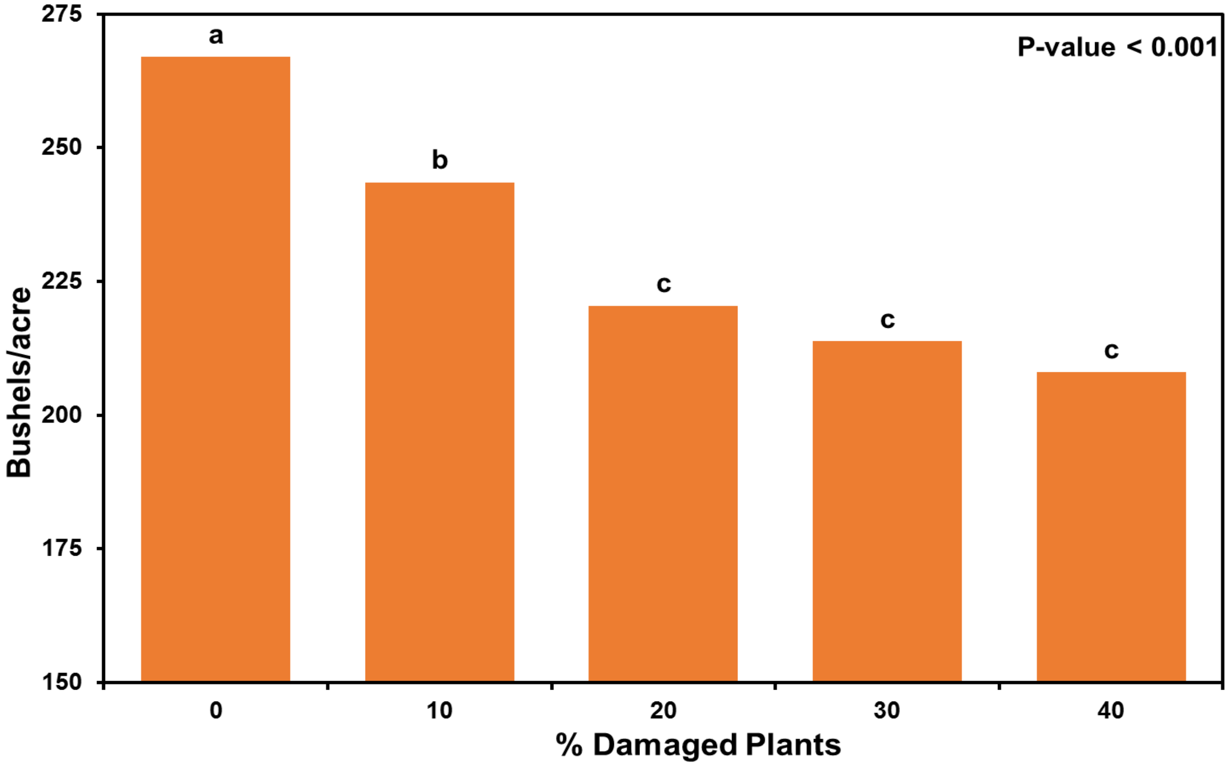

Figure 2. Impact of natural infestation damage on field corn yield (10 ft sections).

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