Turfgrass Research
2018

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JULY 2018

Extent of Larval Populations of Turfgrass Insect Pests at Rocky Ford Turfgrass Research Center at Manhattan, KS

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Introduction

Many insect pests have a larval or grub stage that resides belowground and feeds on turfgrass roots (Potter, 1998; Vittum et al., 1999; Held and Potter, 2012). The major belowground insect pests (white grubs) associated with turfgrass throughout Midwestern states that are present in Kansas include: May/June beetles (*Phyllophaga* spp), masked chafers (*Cyclocephala* spp), and bluegrass billbug (*Sphenophorus parvulus*) (Miller et al., 2013). However, there is limited information on the annual occurrence of these insect pests affiliated with the common turfgrass species planted in Kansas, including zoysiagrass (*Zoysia japonica*) and Kentucky bluegrass (*Poa pratensis*). Therefore, the objective of this study was to determine the extent of larval populations of the major belowground insect pests of Kansas throughout the growing season.

Materials and Methods

This study involved a long-term monitoring program conducted over five years (2013-2017) to assess turfgrass insect pest populations and subsequent damage at the Rocky Ford Turfgrass Research Center, Manhattan, KS. Monitoring efforts focused on bluegrass billbug (*Sphenophorus parvulus*), May/June beetle (*Phyllophaga* spp.), and masked chafer (*Cyclocephala* spp.). In 2013 and 2014, zoysiagrass (*Zoysia japonica*) plots [6.0 × 6.0 feet or 36 feet^2 (1.8 × 1.8 meters or 3.3 meters^2)] were monitored. Ten plots were randomly selected per assessment period. From 2015 through 2017, Kentucky bluegrass (*Poa pratensis*) plots [6.0 × 6.0 feet or 36 feet^2

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(1.8 × 1.8 meters or 3.3 meters^2)] were monitored. Ten plots were randomly selected per assessment period. The monitoring procedure within each plot involved cutting a 6.0 × 6.0 × 6.0 inch (15.2 × 15.2 × 15.2 cm) 'U-shaped' section with a knife and pulling the turfgrass back, then determining if larvae were present. If larvae were present, they were placed into 9 dram (33 mL) plastic vials. The vials were brought back to the laboratory (Department of Entomology; Kansas State University, Manhattan, KS) and were identified based on the rastral (spines or hairs) pattern on the end of the abdomen (Niemczyk and Shetlar, 2000) using a dissecting microscope (Nikon SMZ1000: BioQuip Products, Inc., Rancho Dominguez, CA). The monitoring period for each year varied depending on environmental conditions, especially rainfall. The monitoring periods and number of sampling days for each year (2013–2017) are presented in Table 1.Visual observations were also conducted to assess damage to the turfgrass species associated with the larval populations.

Results

The number of bluegrass billbug, May/June beetle, and masked chafer larvae collected from 2013–2017 are presented in Table 2. In the assessments, the larvae associated with the May/June beetle were early- to late-instar based on size, as this insect has a three-year life cycle (Potter, 1998). In 2015, what appeared to be a European chafer (*Rhizotrogus majalis*) larva was collected at the Rocky Ford Turfgrass Research Center, which would be the first finding of this insect pest in Kansas. However, European chafer larvae were not detected in 2016 and 2017. From 2013–2017, larval populations of the masked chafer and May/June beetle were consistently higher than the bluegrass billbug (Table 2). Nonetheless, in 2017, bluegrass billbug and May/June beetle larvae were detected at higher numbers than in previous years (Table 2).

Discussion

The most abundant and consistent belowground insect pests present during the five-year study were the larval stages of masked chafer followed by May/June beetle. Despite the numbers (depending on year) of bluegrass billbug, May/June beetle, and masked chafer larvae there was no visible damage to the zoysiagrass or Kentucky bluegrass plots. This is likely due to the mild spring weather, amount of irrigation, and summers encountered, especially in 2015, 2016, and 2017. Therefore, it is important to maintain a healthy turfgrass to reduce potential damage caused by the belowground life stages (larvae or grubs) of these common insect pests (Crutchfield et al., 1995; Miller et al., 2013). The results of this study demonstrated that bluegrass billbug, May/June beetle, and masked chafer are present annually; although abundance will vary.

Acknowledgment

The Kansas Turfgrass Foundation provides continual support and funding for this research project.

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Table 1. Monitoring periods (months) and number of sampling days from 2013–2017

Monitoring periods	Number of sampling days
June 7–November 20, 2013	13
June 21–July 19, 2014*	4
August 29–November 10, 2015	9
June 27–November 16, 2016	8
June 17–November 7, 2017	12

*The short monitoring period was due to the author (principal investigator) taking a sabbatical leave from August through October 2014.

Table 2. Number of larvae (grubs)

Insect Pest	2013	2014	2015	2016	2017
Bluegrass billbug	14	0	3	9	18
May/June beetle	27	16	5	10	47
Masked chafer	29	0	34	20	10
European chafer	---	---	1	---	---

Detected in the five-year study (2013–2017) at the Rocky Ford Turfgrass Research Center, Manhattan, KS, associated with bluegrass billbug (*Sphenophorus parvulus*), May/June beetle (*Phyllophaga* spp.), masked chafer (*Cyclocephala* spp.), and European chafer (*Rhizotrogus majalis*) in plots [6.0 × 6.0 feet or 36 feet^2 (1.8 × 1.8 meters or 3.3 meters^2)] of zoysiagrass (*Zoysia japonica*) (2013 and 2014) and Kentucky bluegrass (*Poa pratensis*) (2015, 2016, and 2017).

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