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EENY-541

Tropical Sod Webworm *Herpetogramma phaeopteralis* Guenée (Insecta: Lepidoptera: Crambidae)[1]

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Introduction

Tropical sod webworm larvae are destructive pests of warm season turfgrasses in the southeastern US, especially on newly established sod, lawns, athletic fields, and golf courses. Larval feeding damage reduces turfgrass aesthetics, vigor, photosynthesis and density. The first sign of damage is often caused by differences in grass height in areas where larvae are feeding. Tropical sod webworms are part of a pest complex of warm season turf caterpillars in Florida that include fall armyworm (*Spodoptera frugiperda*), striped grass loopers (*Mocis* spp.), and the fiery skipper (*Hylephila phyleus*).

Distribution

Herpetogramma species attack turfgrasses throughout the 'tropical zone', including Guam, Puerto Rico, Jamaica, Australia, Hawaii, and the United States. In North America, *Herpetogramma phaeopteralis* has been previously recorded from Florida, Georgia, Louisiana, Texas, Hawaii, Mississippi, Alabama, and the Caribbean islands (Kerr 1955; Meagher et al. 2007); however, a comprehensive survey for this pest has not been conducted in recent years.

Figure 1. St. Augustinegrass residential lawn damaged by tropical sod webworm (foreground).
Credits: Steven Arthurs, University of Florida

Description

Adults

The moths are dingy brown, and their wing spread is about 20 mm (¾ inch). At rest, wings are held in a triangular shape. Adult males usually have six abdominal segments, whereas females have five. The terminal segment in males has a slim extension, while the anal segment of the female has a large fusiform opening.

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Figure 2. Adult tropical sod webworm.
Credits: James Kerrigan, University of Florida

Figure 3. Adult tropical sod webworm resting in grass.
Credits: James Kerrigan, University of Florida

Eggs

Adult females deposit clusters of 10 to 35 creamy-white eggs on the upper surface of grass blades. The eggs become brownish-red as they mature. The eggs are flattened, overlapping, and slightly oval in shape. Eggs average 0.7 mm (length), 0.5 mm (width), and 0.1 mm (height).

Figure 4. Tropical sod webworm egg cluster laid on grass leaf sheath.
Credits: Nastaran Tofangsazi, University of Florida

Larvae

Caterpillars are cream-colored with brown spots on each segment and a dark, yellowish brown head. There are six instars, and larval head capsules at their widest points measure 0.225, 0.344, 0.489, 0.676, 0.944, and 1.267 mm, respectively. Average body length of each instar is 1.2, 2.7, 4.1, 6.0, 8.4, and 11.3 mm, respectively.

Figure 5. Tropical sod webworm larval instars, pre-pupae and pupa (L to R).
Credits: James Kerrigan, University of Florida

Pupae

The reddish brown pupae are about 8.5 to 9.5 mm long and 2.1 to 2.9 mm wide. The pupae are normally buried in the upper thatch.

Figure 6. Pupa found in cocoon in St. Augustinegrass thatch.
Credits: Steven Arthurs, University of Florida

Seasonal Biology

In southern Florida, tropical sod webworm adults are present year round, with significantly higher numbers in the fall (September–November). Populations decline over the winter and increase slightly beginning in the spring (March–May) (Cherry and Wilson 2005). In more northern regions of Florida (Gainesville), the peak of flight activity was reported in October and November (Kerr 1955) and August–October (John Capinera, unpublished observations). Indications are that this species does not survive the

winter in the northern part of the state (Kerr 1955), and thus seems possible that some seasonal migration of this species may occur.

Adults rest in sheltered and shrubby areas during the day and are active at dusk (Cherry and Wilson 2005). Adult tropical sod webworms have been observed feeding on nectar sources (Sourakov 2008). Females deposit eggs on grass blades in the evening, and eggs hatch in 3 to 4 days. Tropical sod webworms develop through six larval instars, pre-pupal and pupal stages over 21 to 47 days, depending on temperature. Multiple generations may occur during a year (e.g. three or four generations in southern Florida). Tofangsazi et al. (2012) reported that the lower, upper, and optimum thermal thresholds were 15°C, 35°C, and 30°C, respectively.

Hosts

Tropical sod webworm is a pest of all warm season turf grasses, including centipedegrass (*Eremochloa ophiuroides* [Munro.] Hack.), bermudagrass (*Cynodon* spp.), seashore paspalum (*Paspalum vaginitium* Swartz), carpetgrass (*Axonopus* spp.), zoysiagrass (*Zoysia japonica* Steudel), bahiagrass (*Paspalum notatum* Flüggé) and St. Augustinegrass (*Stenotaphrum secundatum* [Walter] Kuntze). This species is also known to feed on cool season grasses including creeping bentgrass *Agrostis stolonifera* L.

Economic Importance

Turfgrass (sod) production is an important industry in the United States covering more than 25 million hectares, and Florida is one of the main sod producing states cultivating an estimated 37,635 ha and harvesting over 25,495 ha annually (Haydu et al. 2006). Tropical sod webworm is an economically injurious pest of turfgrasses including St. Augustinegrass, the most common turfgrass planted in home lawns in Florida (Trenholm and Unruh 2004). Several large outbreaks of this pest have been reported from Florida and Texas.

Damage

Larvae are the damaging stages. Neonates (first instar larvae) are small (1 mm long) and their feeding activity is hardly noticeable. The first four larval stages (instars) are 'window feeders', i.e., they only feed on the upper surface of grass blades, and so the injury they cause is often overlooked. Fifth and sixth instars can severely damage grass by chewing entire sections off the leaf blade. Larval feeding occurs at night, and larvae hide in the thatch during the day. Caterpillars prefer dry and hot grass areas. Early damage is hard to notice and creates a ragged appearance, but as larvae grow, they consume considerable quantities of grass before pupating. Grass may recover if infestations are not too severe, but feeding damage causes yellowish and brown patches and often leads to the ingress of weeds.

Figure 7. Window feeding on right caused by younger larval instars of tropical sod webworm.
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Figure 8. Tropical sod webworm damage to St. Augustinegrass lawn.
Credits: Steven Arthurs, University of Florida

Figure 9. Close-up of tropical sod webworm feeding damage.
Credits: Steven Arthurs, University of Florida

Figure 10. Mature tropical sod webworm larvae feeding in thatch.
Credits: Steven Arthurs, University of Florida

Management

Despite the economic importance of *Herpetogramma phaeopteralis*, little information on integrated pest management programs of this pest has been reported. Several insecticides may be used to control this pest, but appropriate timing, risks of resistance, and non-target impacts need to be considered. Finding larvae with soap flushes, especially if moths were previously seen, and spot treatment of infested areas are recommended. The sex pheromone of this species, which would allow sex-based monitoring, has not been described.

Chemical Control

Current control recommendations for *Herpetogramma phaeopteralis* are mainly application of above-ground chemical insecticides against larval stages. Control should be against damaging larvae, not the flying moths. Small larvae are generally easier to control than larger larvae. At least 10 chemical compounds are currently registered for control of lawn caterpillars including sod webworms in North America (Tofangsazi et al. 2015).

Cultural Control

Healthy turfgrass, proper fertilization, irrigation and proper mowing can decrease susceptibility of turfgrass against tropical sod webworm. Excessive fertilizing is a leading cause of caterpillar outbreaks in lawns. Healthy turfgrass can also better maintain an acceptable appearance under low to moderate insect infestation pressure. Furthermore, cultural practices such as tillage, thatch removal by vertical mowing or power raking can reduce pest populations. Because eggs are laid on grass blades, removal of grass clipping during this time might also reduce populations.

Figure 11. Tropical sod webworm larvae killed by an entomopathogenic nematode, *Steinernema feltiae* (A), and a healthy control larva (B).
Credits: Nastaran Tofangsazi, University of Florida

Figure 12. Tropical sod webworm larvae killed by *Beauveria bassiana*. The fungus is sporulating on the dead larvae.
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Host Plant Resistance

Plant resistance is a potential tool for managing tropical sod webworm. The following cultivars of St. Augustinegrass were susceptible to *Herpetogramma phaeopteralis*: 'DelMar', 'Floralawn', 'Floratam', 'Mercedes', 'Nortam', 'Palmetto', 'Raleigh', 'Seville', and 'Texas Common'. However, moderate levels of resistance have been observed in cultivars including 'Amerishade', 'Floratine', 'FX-10', 'Captiva', and 'Winchester'. Certain zoysiagrass genotypes and cultivars including 'Cavalier', DALZ8501, and JZ-1 exhibited high resistance to tropical sod webworm (Reinert and Engelke 2001; Reinert et al. 2009).

Biological Insecticides

Entomopathogenic nematodes (esp. *Steinernema carpocapsae*) have been successfully tested against tropical sod webworms in Florida (Tofangsazi et al. 2014). Entomopathogenic fungi (esp. Beauveria bassiana), and the bacterial-based insecticides *Bacillus thuringiensis* var.

kurstaki and *aizawai*, and spinosad (*Saccharopolyspora spinosa* by-product) may help control sod webworms without impacting beneficial species.

Natural Controls

Beneficial arthropods observed attacking tropical sod webworm include several generalist predators, i.e., spiders, lady beetles, big-eyed bugs, syrphid flies, ground beetles, rove beetles, and a variety of parasitoids, mostly *Trichogramma* and an ichneumonid wasp (*Horogenes* sp.). *Trichogramma fuentesi*, was observed parasitizing >80% of sod webworm eggs in our colony. Preserving natural enemies by using low-toxicity insecticides may help limit outbreaks of this pest. However, the impact of biological control agents on tropical sod webworm has not been documented.

Insect Management Guide in Turfgrass

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