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FALL WEBWORM

Insect Pest Management in Hybrid Poplars Series

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Fall Webworm

Hyphantria cunea Drury (Lepidoptera: Erebidae: Arctiinae)

Introduction

Historically, the fall webworm (*Hyphantria cunea)* has been a minor pest in hybrid poplar plantations in the Upper Columbia River basin. However, in 2009, *H. cunea* populations reached unprecedented levels, causing complete defoliation in parts of several planting blocks. Here we alert integrated pest management (IPM) professionals to the potential for *H. cunea* to become problematic in their plantations and recommend means to monitor and control pest populations.

Taxonomy

There are three races of fall webworms in the US, characterized by head capsule color: black, red, or mosaic. Black and red head capsule populations overlap in the eastern US (Oliver 1964), but populations remain reproductively isolated because their mating period is separated in time (Takeda 2005). The mosaic (black-red head capsule) race exists only in the Pacific Northwest (Tufail et al. 2014). Fall webworm colonies produce large and visible silk tents, but IPM managers must realize that other poplar pests may produce silk refuge for protection against vertebrate and invertebrate predators.

Other Lepidopteran species that produce silk webbing include the eastern tent caterpillar, *Malacosoma americanum* (Fabricius), the forest tent caterpillar, *M. disstria* Huber, and the western tent caterpillar *M. californicum*. All belong to the same genus, but they are in the family Lasiocampidae rather than Erebidae. However, *M. californicum* has multiple subspecies. Ciesla and Ragenovich (2008) identified six subspecies, three of which can be found in local populations within California: *M. californicum californicum* (Dyar), *M. californicum ambisimile* (Dyar), and *M. californicum recenseo* (Dyar). *M. californicum pluviale* (Dyar), known as the northern tent caterpillar, is found in the Pacific Northwest and southern Canada; *M. californicum lutescens* is a Great Plains species that extends west to Montana; and *M. californicum fragile* is found in the southwest US. All these species attack poplar and they all spin silk.

Hosts

Fall webworms develop on 90 species of deciduous shrubs and trees, including poplar, willow, alder, cherry, mulberry, birch, walnut, hickory, pecan, elm, maple, sweetgum, oak, etc.

Range

Webworms are a native species and are common throughout the US and southern Canada. The northern limit of their range is latitude 50–55°N (Morris 1963). Sourakov and Paris (2014) provide excellent information on fall webworms in their southernmost range in the US. They have been accidently introduced to both Europe and Asia. In Japan multiple generations can occur each season (Gomi and Takeda 1996; Gomi et al. 2007).

Life History

Fall webworms overwinter (Gomi 1997) as pupae in cocoons in ground litter or lose soil. Depending on an individual’s overwintering site, adult eclosion of cohorts may vary by 30 days the following season. Adults eclose in mid-June through mid-July, mate, and oviposit a flat egg mass consisting of hundreds of eggs (Figure 1A) on the underside of leaves (Hoover 2001). Larvae hatch (Figure 1B) and immediately *en masse* start to spin silk webbing around the foliage (Figure 1C) where they are feeding. Depending on the quality of food, fall webworms may go through as many as 10 larval instars and several color phases (Figure 1D) before pupating. As larvae develop they expand the webbing, and mature larvae venture away from the web at night to feed on adjacent leaves. Larval development is complete within six weeks and mature larvae descend from the web to the ground where they pupate (Figure 1E). Adult webworms in the Pacific Northwest are white; occasionally there are orange setae on legs or the ventral part of the body, while adults in the southeastern US have dark spots in their white wings (Sourakov and Paris 2014).

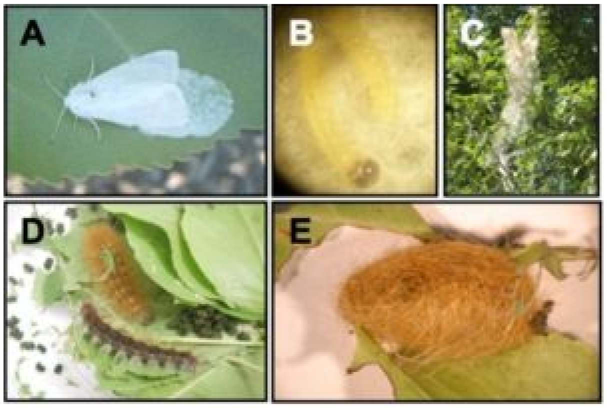

Figure 1. (A) Female fall webworm ovipositing an egg mass, (B) first instar larva, (C) early web formation, (D) mature larvae seeking a pupation site, and (F) the pupal cocoon (Photos by R.A. Rodstrom).

Damage

Webbing is indicative of fall webworm infestations. First instar larvae feed on the upper surface of leaves, causing loss of chlorophyll and browning of leaves (Barbosa and Greenblatt 1979). Larvae remain within webbing during daylight hours, thus avoiding bird predation, and they venture out of the protective web at night to feed. Older larvae can be solitary feeders, often consuming the entire leaf surface except for the midribs. Wild trees are damaged after the onset of next year's buds, so trees survive late season defoliation. In ornamental plantings the webbing is quite unsightly and treatment is required. Untreated populations of webworms can significantly decrease biomass yield.

Notable defoliation generally occurs late in the growing season, but has been observed in early fall (mid-August) in eastern Oregon. This was an almost complete defoliation event and resulted in harvest dry weight yields being reduced by 15–20% (L. Maynard, pers. comm.).

Biological Control

Fall webworm is attacked by many natural enemies in the United States. At least 50 species of parasitic insects attack various stages of fall webworm. Tachinid (Figure 2A) flies [*Blondelia eufitchiae* Townsend, *B. hyphantria* Tothill, *Chetogena claripennis* Macquart, *C. scutellaris* van der Wulp, *Exorista japonica* Townsend, *Lespesia frenchii* (Williston), *Mericia ampelus* (Walker), *Pales pavida* Meigen, and *Zanillia libatrix* Panz] all parasitize webworm larvae (Muesebeck et al. 1951; Arnaud 1978; Sourakov and Paris 2014).

Hymenoptera wasps (Figure 2B) include Eulophidae: *Baryscapus* (*Syntomosphyrum*) (*Aprostocetus*) *esurus* Riley (Hymenoptera: Eulophidae), *Elachertus hyphantriae* Crawford, *E. marylandicus* Girault, and *Elasmus pullatus* Howard. More than 30 predatory insects will also prey on fall webworm caterpillars. Paper wasps (*Polistes* spp.) and yellowjackets (*Vespula* spp.) can be seen hovering around the web looking for an entry point.

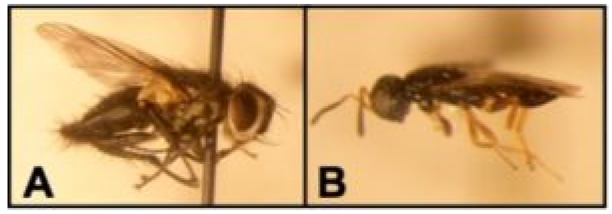

Figure 2. (A) A tachinid parasitic fly, and (B) a chalcidoid wasp, both reared from fall webworm larvae collected in eastern Oregon (Photos by R.A. Rodstrom).

Monitoring

Visual monitoring of webs is the best way to estimate the risk of fall webworms to biofuel crops. In eastern Oregon, researchers developed a subjective 1 to 10 rating system based on how many webs are visible on each side of a block. In this system, 1–2 represents zero to two webs. As the web coverage increases on the side of the block, so does the rating, until there is total defoliation, which is rated 10.

A synthetic sex pheromone (Nitrolure Ameshiro) is available for implementing a male monitoring program for the fall webworm (Idemitsu Kosan C. Japan). These lures were used to determine that there was one flight of fall webworms in eastern Oregon that peaked in early July. Preliminary research does not support the hypothesis that the capture of male moths in a matrix of pheromone-baited traps could be used to identify areas of high risk of defoliation. The strategy could serve as an early warning of possible damage in areas that did not previously have webworm populations.

Management

Natural enemies generally keep fall webworm populations in check. When controls are deemed necessary, managers should try to protect biological control agents. Initial infestations in biofuel plantings can be physically removed by pruning the branch containing the web, burning or shredding the infested branch, and disposing the waste off site. To minimize defoliation, webs should be destroyed while caterpillars are still small (McCullough and Siegert 1999).

If chemical control efforts are needed, the developmental stage of larvae must be determined. Early instar larvae can be controlled with an insect growth-regulating insecticide or *Bacillus thuringiensis* (*Bt*); larger instars may require a broad-spectrum insecticide. Currently there is a Special Local Need registration (SLN #OR-080033) for Dimilin (diflubenzuron) an insect growth-regulating insecticide targeting young instar larvae early in the season. Although damaging to natural enemies, Steward (indoxacarb) will control late instar larvae and it is currently registered for use on trees grown for pulp and wood in Oregon and Washington. Another natural enemy friendly chemical is Blackhawk (spinosyn A+D) that can be used to control webworm populations. Coragen (chlorantraniliprole) is currently available in Oregon (SLN #OR-100009) and it is considered very effective against the fall webworm.

Coragen can control fall webworm populations with a single application; whereas often Steward must be used twice. Dimilin and Blackhawk are as effective as Coragen but their application must target early instar larvae.

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Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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