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POPLAR SATIN MOTH

Insect Pest Management in Hybrid Poplars Series

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Poplar Satin Moth

Leucoma salicis L. (Lepidoptera: Erebidae: Lymantriinae)

Introduction

Multiple pesticides are available to control satin moth populations that are occasional pests of nursery plants (Rinehold 2015). However, integrated pest management (IPM) practitioners have limited pesticides that can be used to protect poplars grown for Forest Stewardship Council (FSC) certified pulp and wood products east and west of the Cascade Mountains in Oregon and Washington. This publication contributes additional information regarding identification, life history, monitoring, and FSC-approved management strategies to control *Leucoma salicis*.

Taxonomy

Erebidae is one of the largest families of macro-moths and includes the satin moth as a member of the Tussock moth subfamily, Lymantriinae. Tussock moths are notorious pests of forests in the US. Included in this group are the gypsy moths, *Lymantria dispar* L., and the Douglas-fir tussock moths, *Orgyia pseudotsugata* McDunnough. Other members of the Erebidae feeding on poplar in the Pacific Northwest include: the fall webworm, *Hyphantria cunea* Drury subfamily Arctiinae; black/white underwing moths, *Catocala relicta* Walker; and the spotted tussock moth *Lophocampa maculata* Harris subfamily Erebinae (Crabo et al. 2016). Adult satin moths and adult fall webworm are very similar in appearance.

Hosts

Leucoma salicis larvae feed mostly on poplar, willow, and aspen (Wagner and Leonard 1979; 1980). Humphries (1984) reported satin moths feeding on Saskatoon (*Amelanchier* spp.), oak (*Quercus* spp.), and crabapple (*Malus* spp.).

Range

Satin moths are an invasive species from Eurasia. They caused the first severe defoliation of eastern cottonwood in the early 20th century (~1920). They were found in New Brunswick, Nova Scotia, Quebec, Ontario, and Maine in the east, and Alberta, British Columbia, California, Idaho, Nevada, Montana, Oregon, Utah, Washington, and Wyoming in the west (Latchininsky 2016; USDA Forest Service 2016).

Life History

In mid-summer the first instar hatches and feeds on foliage for a month (Figure 1) before seeking an overwintering site in a crack or crevice, where it spins a silken hibernaculum, molts to a second instar, and survives winter conditions. Dormancy is broken in May and by mid-June when notable, even significant, defoliation becomes apparent. Development from the overwintering second instar through the ultimate seventh instar takes place within 90 days (Ferguson 1978). The most damaging larval stages are 3rd through 7th instars (Zurek and Keddle 2000) in June. Full-grown larvae are conspicuously colored with 10–11 (intersegmental) white spots on their dorsal surface (Figure 2), and they wander down the trunk of their host tree in search of a pupation site (Figure 3). Adult moths emerge in July (Figure 4). They are poor fliers and are mostly active at night, when they mate. Females lay egg masses on the undersurface of leaves. The first egg mass is generally the largest, but females average 4.6 egg masses and can total 650 eggs oviposited and covered with frothy secretions (Wagner and Leonard 1979).

Figure 1. Egg mass and 1st instar satin moth larva on leaf (Photo by R.A. Rodstrom).

Figure 2. A mature satin moth larva initiating a wandering period in search of a site to pupate (Photo by R.A. Rodstrom).

Figure 3. Aggregation of satin moth pre-pupae and pupae on bole of poplar tree (Photo by R.A. Rodstrom).

Figure 4. Male (note large antennae) satin moth on bole of poplar tree (Photo by R.A. Rodstrom).

Damage

Severe defoliation (Figure 5) can result in top-kill and tree mortality (Humphreys 1984). In Oregon and Washington most damaging populations are found west of the Cascade Mountains. Satin moths exist east of these mountains, but in the past fifteen years they have not caused noticeable damage in trees grown for pulp or saw timber.

Figure 5. Severe defoliation in poplars grown for biofuels in western Oregon in 2015 (Photo by R.A. Rodstrom).

Biological Control

Satin moth is subject to attack by egg, larval, and pupal parasitoids (Cobanoglu 1992; Wagner and Leonard 1980). Pathogens include a multicapsid nucleopolyhedrovirus (MNPV) that may have potential for controlling satin moth populations (Jakubowska et al. 2005; Ziemnicka 2008) and two fungal agents, *Paecilomyces* sp. and *Hirsutella gigantean* Petch (Wagner and Leonard 1980), but none are commercially available at this time.

Monitoring

The sex pheromone 3Z-cis-6,7-cis-9,10-diepoxyheneicosene (Gries et al. 1997) called leucomalure (Muto and Mori 2003) is available to capture male satin moths in baited traps, but populations can easily be monitored with black light or mercury vapor light traps. Visual monitoring with special attention to areas with defoliation is encouraged. Visual inspection of the boles of trees for evidence of mature larvae searching for pupation sites (Figure 3) in June can alert managers to possible outbreak populations the following year. Sample five trees in a row, move left or right five rows, and continue down that row ten trees. Sample five more trees and repeat this pattern at least three times. Concentrate your attention on the terminals, and examine ten leaves in the top four branches in each cardinal direction. When defoliation triggers a management decision, a final pretreatment examination of as many trees as possible should be made. A V-pattern can be used, where you examine three trees, move three rows over, left or right, and down five trees, sampling three more trees in that row. Repeat this pattern three times and then reverse the pattern to return back to the edge of the stand. If an entire block is in question regarding a treatment, repeat this pattern on the opposite side of the block.

Management

Natural enemies generally keep satin moth populations in check, but other control measures may be needed when trees grown for biofuel, FSC-certified pulp, or saw timber are suffering severe defoliation. When 25–30% of the trees have significant defoliation, controls are deemed necessary, and managers should try to protect biological control agents. Currently there is a Special Local Need registration for Dimilin (diflubenzuron), an insect growth-regulating insecticide that targets young instar larvae early in the season in Oregon. 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. Other FSC-allowed insecticides include Conserve, Blackhawk (spinosad), and Coragen (chlorantraniliprole).

If poplars are not being grown for FSC certification, several alternative insecticides will control this pest. Satin moth populations can be controlled by spraying organophosphate insecticides (chlorpyrifos, dimethoate, or malathion), a carbamate (carbaryl) or synthetic pyrethroids (cyhalothrin or permethrin) according to label instructions. Currently, Oregon and Washington have registered the use of all these insecticides to protect tree pulp/wood production.

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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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