WESTERN POPLAR CLEARWING MOTH
Insect Pest Management in Hybrid Poplars Series

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Western Poplar Clearwing Moth

Paranthrene robiniae (Hy. Edwards) (Lepidoptera: Sesiidae)

Introduction

As a result of Washington State University integrated pest management (IPM) research (Brown et al. 2006; Kittelson 2006), all commercially grown poplars in the Pacific Northwest for Forest Stewardship Council (FSC) certified products are now protected by a pheromone-based male confusion strategy against western poplar clearwing moths. Professional IPM practitioners can use this publication as a guide toward control of this moth in the Pacific Northwest.

Taxonomy

The larvae of clearwing moths (Figures 1 and 2) that attack poplars can be found throughout the US. Paranthrene robiniae occurs west of the Rocky Mountains, P. dollii (Neumoegen) is found throughout the southeastern states (Ostry et al. 1988), and P. tabaniformis (Rottemburg), sometimes called the European poplar clearwing moth, can overlap with both P. robiniae and P. dollii in the central portion of the US. Using commercially available sex pheromones which are species-specific for clearwing moths, we captured another clearwing moth, Sesia tibialis (Harris), also called the cottonwood crown borer, or American hornet moth in eastern Washington (Kittelson 2006). Although not a clearwing species, LaGasa et al. (2001) reported capturing a European species, the poplar shoot moth Gypsonoma aceriana (Duponchel), damaging poplar in western Washington. Another twig borer, G. haimbachiana (Kearfott) has been found in the eastern US attacking P. deltoides (Morris 1967). Both these Gypsonoma species are members of the Tortricidae family of Lepidoptera.

Two burrowing Lepidoptera larval pests of poplar have the species name robiniae. These are the western poplar clearwing moth, P. robiniae, and the carpenterworm moth, Prionoxystus robiniae.

Poplar-and-willow borer larvae, Cryptorrhynchus lapathi (L.) (Coleoptera: Curculionidae), also burrow into poplar branches and boles (Hannon et al. 2008).

Hosts

Larvae of P. robiniae attack poplar, willow, aspen, and birch.

Range

Western poplar clearwing moths are found throughout the states west of the Rocky Mountains, and British Columbia (Lee 2014). Pearson et al. (2010) have reported P. robiniae as far east as western Colorado.

Life History

Five larval instars develop within galleries in the bole and stems (Figure 1) of poplars. Multiple pupal cases (Figure 2) are evidence of a large population.

Third through fifth larval instars overwinter (Figure 3) within boles and stems culminating in adults (Figure 4) that emerge from April through July the following year. In April, adults mate and gravid females deposit eggs individually. Pupae found in first year whips suggest a small proportion of each year’s population can be completed within one season.

Figure 1. Western poplar clearwing moth larva burrowing within the pith of poplar branch (Photo by N. Kittelson).
Eggs deposited after mid-June complete partial larval development and overwinter as late instar larvae. Eggs are brown, ovate, and slightly concave dorsally and ventrally, with a surface usually sculptured with minute ridges in hexagonal designs (Eichlin and Duckworth 1988). Larvae hatch from eggs in about 14 days, depending on ambient temperatures (Forschler and Nordin 1989).

**Damage**

Larval galleries weaken stems (Figure 5) and boles of host trees which causes wind-lodging and occasional girdling, resulting in poor growth patterns or death of plantings. Cuttings from nurseries are sometimes infested with late instar larvae. Four extensive reviews of insect pests of poplar by Ostry et al. (1988), Chastagner and Hudaki (1999), Coyle et al. (2005), and Charles et al. (2014) did not identify *P. robiniae* as a pest of poplar. Brown et al. (2006) reported that 44% of trees surveyed were infested with clearwing moths and 35,731 newly planted cuttings had to be replanted due to clearwing attack.

**Biological Control**

Clearwing larvae have been found parasitized within galleries of limbs in eastern Oregon. Although not identified, these parasitoids could be either a Braconidae (Greorgiev 2001a) or Ichneumonidae (Greorgiev 2001b) wasps. Kaya and Lindegren (1983) and Kaya and Brown (1986) reported that *Steinernema feltiae* and *S. bibionis* nematodes controlled clearwing moth larvae in alder and sycamore. These authors reported successful use of nematodes for biological control of clearwing larvae and their research finding was corroborated by Shapiro-Ilan and Cottrell (2006).
Monitoring

Cowles et al. (1996) identified the sex pheromone of *P. robiniae* as a 4:1 ratio of (E, Z): (Z, Z)-3, 13-octadecadienyl alcohol. A red septum loaded with one milligram of the *P. robiniae* sex pheromone should be used in Oregon and Washington to bait each bucket trap (Unitrap). Both the septa and trap can be purchased from Suterra (Bend, Oregon). One trap loaded with synthetic sex pheromone and a one-inch strip of Pest Strip containing dichlorvos as a killing agent should be positioned in the center of each 160-acre (65 hectare) unit of poplars. These traps should be deployed in mid-April, and each week the traps need to be emptied. The number of moths captured should be counted and recorded. Lures should be replaced approximately every two months, and monitoring should continue throughout the season until no moths are captured. The capture date of the first *P. robiniae* adult male using these sex pheromone-baited traps over a decade is related to our degree-day models.

Degree-day models are scientifically validated measures of insect development achieved by rearing specific insect populations in laboratory conditions (i.e., temperature/lighting/humidity controlled incubators). A model enables a pest manager to make predictions as to when the first pest species adult will be observed or captured each spring. Once captured, that date becomes the ‘biofix’ for subsequent accumulated degree days (ADD) data. That additional ADD information will then predict when various developmental stages of that pest species can be expected during the growing season. This knowledge can be used to time pest management strategies to effectively lower pest populations. The ADD calculations below were made using pheromone baited traps for western poplar clearwing male moths and temperature information gathered from the ‘HERO’ AgriMet weather station (Oregon State University) near Hermiston, Oregon. The ‘single-sine’ method (Jones and Brunner 2015) with a 10°C (50°F) minimum threshold, beginning January 1, was used to predict first male moth capture each spring. In eastern Oregon and eastern Washington the first flight of male clearwing moths has been observed in pheromone-baited traps over the past decade. Adult males have been captured as early as 12 April 2003 and 2004 and as late as 13 May 2009. Typically, the first clearwing moths, the biofix, can be expected after the accumulation of 123° ± 8° ADD.

After leaves drop off the trees in late autumn, an annual survey should target infestations of stem, bark, and bole pests. A chunky, sand-like texture of detritus indicates a western poplar clearwing moth larval gallery. If the detritus has a stringy texture, the gallery is probably occupied by a poplar-and-willow borer larva (*Cryptorhynchus lapathi* L.), rather than a clearwing larva. These observations should be shared with other employees and revisited each year to determine the areas with the most serious infestations.

Management

Bentley et al. (1994) recommended repeated applications of chlorpyrifos for control of adult clearwing moths in California, but this did not work in Oregon and Washington (Brown et al. 2006). Saturation of the ambient air with synthetic sex pheromone has proven successful toward the control of clearwing moths in large (>3,000 hectares) plantations of poplars grown east of the Cascade Mountains (Kittelson 2006). In these poplar plantings where a male confusion strategy results in a saturated pheromone situation, monitoring traps baited with just one milligram of pheromone will be shutdown. A ‘super’ lure loaded with 10 milligrams of pheromone should be used in monitor traps within a pheromone-saturated situation.

References


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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