April 2005
5.9
WEB July 2010

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US Forest Service

Forest Health Protection and State Forestry Organizations

Management Guide for

Western Pine Shoot Borer

Eucosma sonomana (Kearfott)
(Lepidoptera: Olethreutidae)

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Young, open grown ponderosa pine the western pine-shoot borer is a significant pest that stunts or sometimes kills the terminal shoot by boring down through its center.

Hosts:

- Ponderosa pine (*Pinus ponderosae*)
- Lodgepole pine (*Pinus contorta*)
- Jeffrey pine (*Pinus jeffreyi*)
- Engelmann spruce (*Picea engelmanii*).

Damage

Larval mining in the terminal shoots reduces or stops shoot and needle elongation and can effect the development of new buds.

Larval mining in lateral shoots usually kills shoots.

Each attack of the terminal shoot reduces annual height growth by 25% and sometimes damages tree form.

Key Points

- Western pine-shoot borer attacks start when pines are approximately breast height (4.5 feet) and gradually increase over the next 25-30 years.
- In older plantations it is common for 50% of the trees to be attacked on an annual basis.
- Fast growing pines are more likely to be attacked than slow growing pines.
- Frequently the tip of infested lodgepole pine terminals will die back by late fall.

Life History

Eggs hatch and young larvae enter shoots near terminal buds and mine downward in the pith leaving little evidence of attack. Larvae complete development by midsummer. Usually there is only one larva per shoot and it chews a circular exit hole in the lower part of the shoot, falls to the ground, and pupates for the winter.

Shoot borer overwinters as pupae in cocoons in ground litter under infested trees.

Signs of Attack—

- This moth does not leave feeding scars, webbing or frass on the surface of infested shoots.
- Borer infestations can usually be diagnosed by examining the form of the current year's terminal shoot.
- Attacked shoots become thickened but do not wilt and their needles usually remain green, but are shorter than normal giving the terminal a "shaving brush" appearance.
- Because the infested terminal does not fully elongate, lateral shoots are often longer than the infested terminal. A normal, un-infested terminal is usually 25-40% longer than lateral shoots on the same tree.

Western pine shoot borer mining within the pith of an infested shoot. Photo by Jed Dewey. www.forestryimages.org

- Exit holes from the pith are visible near the middle of the shoot where the larva has bored out from the pith.
- The upper third of attacked pine shoots (laterals and terminals) will be tightly packed with frass (a combination of boring dust andinsect excrement). On terminal shoots the xylem and phloem are not usually damaged.
- Infested lodgepole pine is less obvious from a distance than infested ponderosa pine. Larval feeding is more destructive in small diameter lodgepole terminals and emergence holes can weaken the stem resulting in breakage.
- Frequently the tip of infested lodgepole pine terminals will die back by late fall. Laterals will then compete with terminals for dominance but the effects on tree form are usually minor.

Management Considerations

Prevention—Intensive site preparation and brush control designed to increase growth in pine plantations result in higher levels of shoot borer infestations.

Ponderosa pines grown on drier sites often suffer higher levels of infestations.

When pine plantations are planted at higher elevations, shoot borer damage is either minor or absent.

Plantations on some habitat types are not infested heavily. Stoszek (1973) determined three hazard categories:

1. Low hazard = sites with *Abies* species on mesic mixed conifer sites.

2. Medium hazard (about 40 percent of leaders infested yearly)= snowbrush-manzanita habitat types within mixed conifer zone and ponderosa climax zone.

3. High hazard (50 to 70 percent leaders infested yearly)= Bitterbrush habitat types within ponderosa zone and grassy types of the mixed conifer zone.

Developing stands having a mixture of Douglas-fir and pine tend to suffer less damage.

Indirect Control—Tree genetics affect susceptibility to western pine-shoot borer attacks. Certain site and stand characteristis have also been found to influence the rate of attack (see prevention).

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Web References:
www.forestryimages.org/images

Forest Health Protection and State Forestry Organizations

Assistance on State And Private Lands

Montana: (406) 542-4300

Idaho: (208) 769-1525

Utah: (801) 538-5211

Nevada: (775) 684-2513

Wyoming: (307) 777-5659

N.Dakota: (701) 228-5422

Assistance on Federal Lands

US Forest Service
Region One
Missoula: (406) 329-3605
Coeur d'Alene: (208) 765-7342

US Forest Service
Region Four
Ogden: (801) 476-9720
Boise: (208) 373-4227

Pheromones— Susceptible pine plantations can be monitored for western pine shoot borer with the male sex pheromone in a wing type pheromone trap. The current recommendation is to use at least 3 traps at each location, separated by at least 20 yards. For large sites consider 1 trap per 2.5 acres (hectare).

Mating disruption has proven effective at reducing damage, but a commercial supplier of pheromones for this use is not currently available. Contact your local Forest Health Specialist for current information.

Pesticides—Insecticides, contact or systemic, have proven ineffective at controlling western pine shoot borer damage.

A new technique using synthetic pheromone baits to attract male moths and kill them has proven effective at reducing damage in pine plantations and is registered for use. Pines must be treated with this hand-applied formulation by mid-march, before any moth flight has occurred. The product is named Last Call™EucosmaAK and is available through Advanced Pheromone Technologies, Inc. of Portland, Oregon.

Warning- remember, when using pesticides, always read and follow the label!

Other Reading

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