

The pest:

Adult Western pine shoot borer, *Eucosma sonomana*



◆ The reproductive flight begins early in the year (coinciding with Manzanita bloom) and lasting about one month.



Larva tunneling terminal

- ◆ Only one generation per year.
- ◆ Attacks the most healthy, vigorous trees with thick terminal shoots.
- ◆ Female oviposits eggs singly under terminal bud scales. One egg per tree.
- ◆ Larva tunnels inside the terminal causing growth reduction and deformation.
- ◆ Trees are most vulnerable between 6-24 feet.
- ◆ Attacks ponderosa, Jeffrey, and lodgepole pines.
- ◆ Rarely kills terminal shoots, so plantations appear healthy.
- ◆ Moth population can be monitored with pheromone traps.



How to recognize the damage:



Early season damage:

Terminal growth stunted on entire leader. All needles on terminal form dense brush. Needles usually shorter than average length of needles elsewhere on the tree.

Middle season damage:

Needles on top of terminal shorter and growing denser than needles at the bottom of terminal. The outline of all the terminal needles has an "hour-glass" shape.



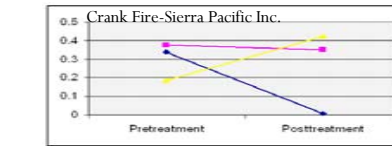
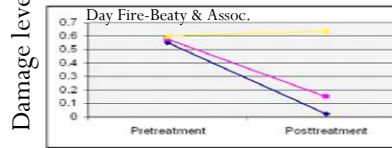
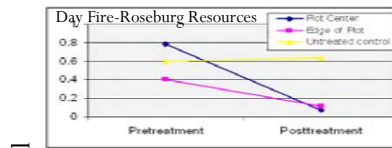
Late season damage:

Needles at the top of terminal much shorter than needles at the bottom of terminal causing conical appearance of leader.



Side branches overgrowing stunted terminal leader causing forking.

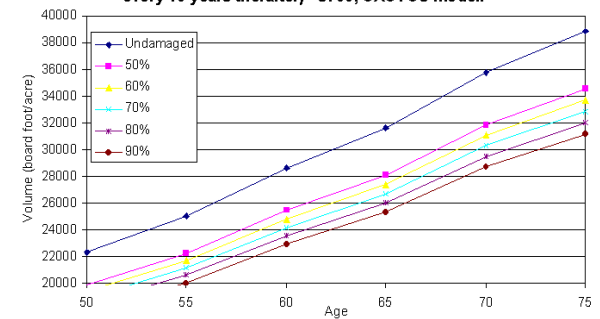
Benefits of treatment:



With MalEx treatment:

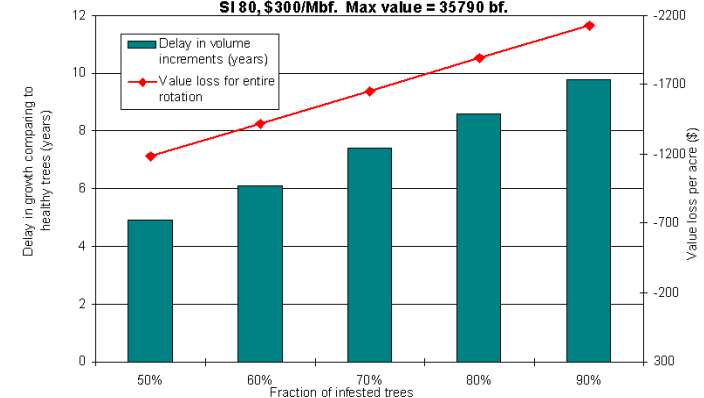
- ◆ A single application keeps pest damage below economical levels, even plantations with 90% infestation.
- ◆ The entire rotation period (55-70 years) will be protected by 2-3 treatments in young plantations.
- ◆ Timber yields can be increased by 3,940 - 7,090 bft/acre.

Amount of merchantable ponderosa pine timber (including volume harvested during commercial thinning @ age 40 & every 10 years thereafter) - SI 80, CACTOS model.



- ◆ The 60-year harvest rotation of ponderosa pine can be reduced by at least 5—10 years.
- ◆ Lack of WPSB management results in a \$1,181-\$2,125/acre decrease in timber value at the end of the rotation.

Growth delay (years) and value loss (\$) of ponderosa pine infested with WPSB at different levels and average 22% loss of terminal elongation. Values calculated for 70 year rotation in NE California, CACTOS model, SI 80, \$300/Mbf. Max value = 35790 bf.





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EPA Reg. No. 85354



MalEx™ ShootBorer

**Attracts, kills & controls
shoot borers and tip
moths on pines.**

▶ **Effective**

▶ **Selective**

▶ **Residue-free**

How it works:

pheromone to attract + insecticide to control

MalEx ShootBorer combines the best aspects of two technologies: Pheromone attraction and traditional chemical insecticides. The resulting product provides shoot moth control that is effective, selective and residue-free.

Each 50 microlitre droplet contains Permethrin, a potent knock-down insecticide, and a synthetic version of the pheromone released by a female shoot borer to attract, or 'call', a mate.

The attractant and insecticide are combined in a patented, UV-absorbing carrier material that provides a slow, uniform release of the powerful pheromone. Male moths are inevitably attracted to the small droplets of MalEx ShootBorer with which they attempt to mate. Any contact with the product kills or disables them (MalEx = Ex Male), thus preventing mating and subsequent egg-lay and larval infestation.

MalEx ShootBorer uses pheromones as they were intended to be used: to attract males. They are not confused or overwhelmed. They are simply and biologically attracted. Then, the insecticide component of MalEx kills them. Dead males don't mate.

How to use it:

only 600 tiny droplets per acre

MalEx ShootBorer comes in an applicator tube complete with a calibrated pump that deposits metered droplets of product exactly where you want them. Only 600 evenly-spaced droplets are needed to protect an acre of pines for a season. Droplets may be placed on either bark or needles. Droplets should be placed on the tree within hand reach. MalEx ShootBorer targets shoot borers: *Eucosma sonomana*, *E. gloriola*, and *E. recissoriana*.