

## **European Pine Shoot Moth** (*Rhyacionia buoliana*, Dennis & Schiffermuller)

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### **What is European Pine Shoot Moth?**

The European pine shoot moth is an exotic insect native to Europe, the Eastern Mediterranean region and Japan. It was first discovered in the United States in 1914 on an ornamental Scotch pine (*Pinus sylvestris* L.) on Long Island, NY. Soon after, the insect was discovered in the Great Lakes Basin, the northeastern United States and the neighboring Canadian provinces, and even in Oregon, Washington and British Columbia. The following year, 1915, a quarantine was established prohibiting pine imports from Europe. Today, this pest is widespread, particularly in the northeastern part of the US. It is especially fond of mugho, Austrian and Scotch pines. Though it can cause significant damage to its host tree, it rarely kills it. The moth's economic impact on the Christmas tree industry and natural pine stands, however, can be significant since it causes impaired and misshapen growth and overall loss of aesthetic value.

### **What is the lifecycle of the insect?**

The adult moths start emerging from their pupation sites in new pine shoots during May and June. They mate soon after emergence, lay their eggs on the bud scales, at the base of the pine needles, and on the bark. In only seven to ten days, the eggs hatch. The tiny caterpillars immediately burrow into the base of the needles and begin feeding. As the larvae feed, their damage intensifies. Usually by mid to late August, they move to the base of the buds and start tunneling, creating a winter shelter for themselves. The following spring, just when the new pine shoots start to grow, they emerge and resume their destructive feeding on these new shoots and buds. This is the time period (late April-mid May) when they are most active and cause the most damage. They then build pupal cavities in the shoots where, in three weeks, they pupate and emerge as adult moths to continue their life cycle.

### **What does an infestation look like?**

An early indication of an infestation is a pine's stunted growth resulting in wilted and dead shepherd's hook-like terminal shoots. Figure 1 shows these symptoms on mugho pine. Notice the brown, dead needles on the tip of the shoot. Figures 2 and 3 show symptoms on Austrian pine with typical curved shoot tip and resin flowing from the hole where the larvae had been feeding as they tunneled through the shoot creating a gallery. Figure 3 shows the gallery left behind.



Figure 1(a): Shoot moth damage on mugho pine shoot tip; (b): Symptoms on Austrian pine. Note the pine resin covering the entrance hole; (c): Symptoms on Austrian pine showing gallery in the shoot tip.

## What can be done about it?

Knowing the moth's developmental cycle and understanding where on the pine tree the insect will be during its different life stages is helpful in developing a control strategy. Since they live on and around the shoot tips, pruning the tree once the candles are fully formed (mid to late July) will remove most of the larvae and greatly reduce the need for insecticides. Proper sanitation (removing and destroying all the clippings) is essential for preventing re-infestation.

If pesticides must be used, the most effective would be a systemic insecticide (chloropyrifos). Spray in spring and target the overwintering larvae as they emerge and move from bud to bud (April-May). Summer sprays could be fine-tuned for improved efficacy with the aid of traps and pheromones to monitor the adult emergence. Spray applications should occur ten days after the peak adult emergence (mid-late July).

Since the larvae spend most of their lives tunneling in the interior of the plant tissues, contact insecticides (cyfluthrin, permethrin, bifenthrin /UP-STAR GOLD®, Carbaril®/Sevin®, etc.), which require contact with the insect, are not very effective. These sprays can only provide some control if their application is carefully timed when the larvae are actually outside their tunnels and exposed, moving from one feeding site to another. Systemic insecticides like Dursban® (chloropyrifos) and Halix® (thiametohoxam) would provide better control.

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