



Pandora Moth

Forest Health Fact Sheet

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Pandora moth adult

William Ciesla, FH Mgr. Int., Bugwood.org

Pandora moth (*Coloradia pandora linseyi*) is our largest and perhaps most charismatic forest insect pest. In its larval stage it is a defoliator of pine trees. Outbreaks from this insect are cyclical but highly variable in recurrence and duration. Pandora moth has a 2-year life cycle, the defoliating larval stage typically occurs in even number years. The last major outbreak from this pest in Oregon was in Central Oregon from 1988-1996 but a small increase in populations was observed in 2016. This insect occurs where pine grows in loose, volcanic soils. Mature larvae and pupae are traditional foods collected by several Native American tribes such as the Paiute, Klamath and Modoc.

Hosts

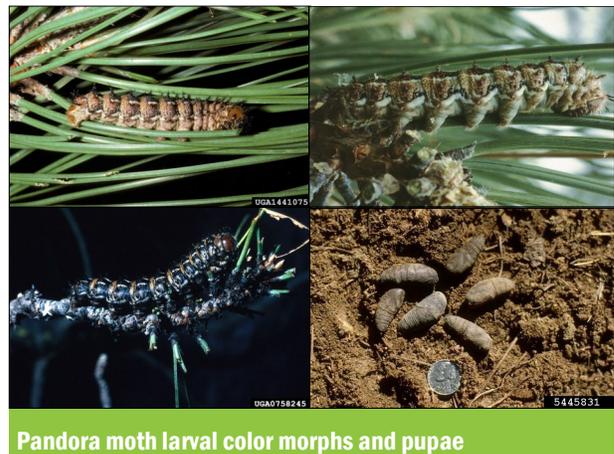
- Major: ponderosa, lodgepole and Jeffrey pines
- Minor: sugar pine

The range of Pandora moth extends through most western states. In Oregon, they are most often found in areas with loose, volcanic soils such as central Oregon.

Biology

Eggs hatch in late summer and larvae begin feeding on pine needles. When temperatures drop, larvae retreat to the base of needles to overwinter and resume feeding the following spring. The larvae are voracious eaters grow from <1/4" to 3" as they develop through five molts. Larvae may be brown, black or green and may have patterns to blend in with pine branches. When ready to pupate in their second summer, larvae will travel down trees and burrow in the soil. They prefer loose, volcanic soils and are often found in areas of historic volcanic activity. The second winter is spent in the pupal stage and adults emerge July - August. Adults often congregate around light sources, sometimes far from host trees. Adults have up to a 4" wingspan, and are grey-brown

with pink accents and a black spot on the underside of each hind wing.



Pandora moth larval color morphs and pupae

Clochevise: USFS R2, William Ciesla, Darrell Ross (OSU), USFS R3, Bugwood.org

Damage

Older needles are preferred host material and buds are untouched, therefore tree mortality is uncommon unless combined with other factors such as drought, heavy dwarf mistletoe infestation or physical damage. Mass defoliation results in a "lion's tail" appearance in branches, caused by defoliation of just the older needles.

Defoliation represents a loss of photosynthetic tissue which can cause growth loss.

Outbreak intervals can range from 9-156 years and each individual outbreak typically lasts 5-8 years. Large amounts of frass (larval droppings) are usually evident on the forest floor during an outbreak. Outbreaks typically collapse from predation by vertebrates and invertebrates, parasitism and NPV (nuclear polyhedrosis), a common disease in dense populations of caterpillars.

Management

Silvicultural

Periodic thinning and mistletoe management will improve resilience in trees, which allows them to withstand mass defoliation during outbreaks.

Mechanical

Prescribed burns, conducted when larvae are traveling to the soil to pupate or when pupae are in the ground, have had variable success. Burning creates a wildfire risk and causes damage to the tree, which reduces vigor and resilience against defoliation.

Insecticides

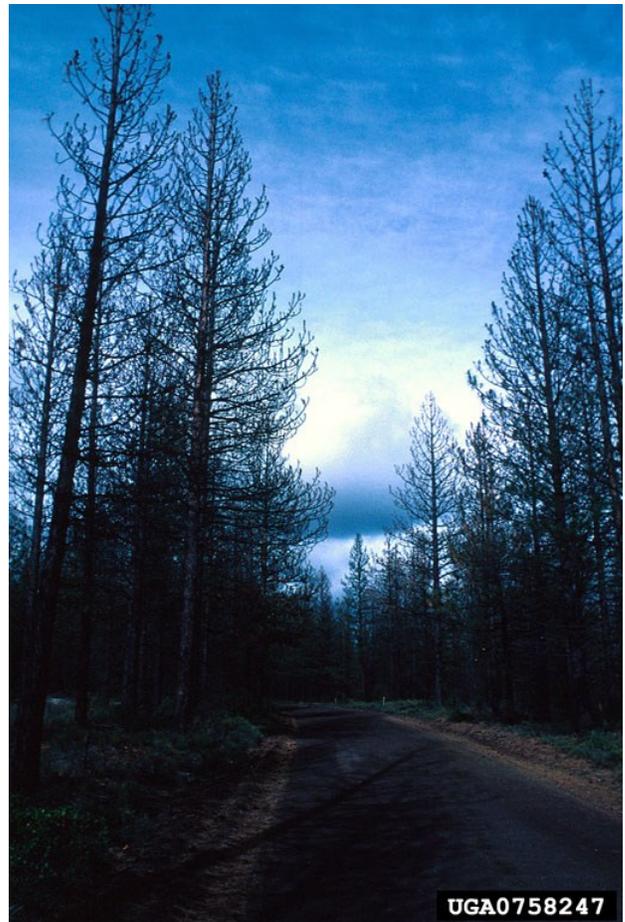
Insecticides are typically not necessary because outbreaks tend to collapse on their own due to natural controls.

In severe outbreak scenarios treatment with insecticide may be warranted. *Bacillus thuringiensis* (Bt) is an effective insecticide with few non-target impacts. Insecticides are most effective when applied in the summer immediately before pandora moth larvae start feeding. Small-scale applications can preserve foliage in high-value areas. Annual applications of insecticides for several years may be necessary to protect trees until an outbreak subsides.

When using pesticides, always read and follow the label

Management

- Avoid planting pine in rocky, harsh sites
- Thin dense stands
- Manage dwarf mistletoe
- Apply Bt in the summer before larvae start to feed (not necessary for small outbreaks)



"Lion's tail" from heavy defoliation from pandora moth during an outbreak

William Ciesla, FH Mgt. Int., Bugwood.org

More information:

Oregon Dept. of Forestry, Forest Health
<http://tinyurl.com/odf-foresthealth>
2600 State St. Bldg. D, Salem, OR 97310
503-945-7200

Other references:

USFS Forest Health Protection
www.fs.usda.gov/goto/fhp/fidls

OSU Forestry Extension
<http://extensionweb.forestry.oregonstate.edu/>