



Forest Health Note

Hosts:

Infestations commonly occur on ponderosa, Jeffrey, sugar, and lodgepole pines. Infestations on Douglas-fir and white fir are rare, but are increasing in central Oregon.

Importance:

High populations of this armored scale cause loss of older needles, reduced growth in new needles and shoots, and branch dieback. After several years of defoliation by black pineleaf scale, a tree's crown is damaged to the point where it becomes susceptible to bark beetle attack. Scale outbreaks often occur in the urban-forest interface as a result of insecticide drift from mosquito control projects or agricultural spraying. The parasitic wasps that normally control scale populations are very sensitive to some insecticides. If these wasps are killed, black pineleaf scale populations rapidly increase to damaging levels.



Figure 2: After several years of scale defoliation, branches develop a "lion's tail" appearance.

Black Pineleaf Scale (*Nuculaspis californica*)

Look For:

In ponderosa pine, thinning foliage in a tree's mid- to lower-crown is frequently a sign of a black pineleaf scale infestation (Figure 1). Often branches retain only new needles and the otherwise defoliated branch is described as having a "lion's tail" appearance (Figure 2). Close examination of the needles will show a line of black scale shells along its length (Figure 3). At the point of scale attachment to the needle there is usually a necrotic yellow spot. If enough scale are present, the entire needle may have a yellow cast. When looking for signs of scale infestation on large pines, where living foliage is not easily reached for examination, scale can often be located on the shed needles around the base of the tree. Another species of scale, *Chionaspis pinifoliae*, or pine needle scale (Figure 4) is often found in association with black pineleaf scale.

Biology:

In Oregon the black pineleaf scale has one generation per year. The scales visible on needles are all females and immobile. Scale eggs are laid under the shell in June and hatch into mobile nymphs or crawlers in July (Figure 5). The only method by which scale can spread to new hosts is for the very small crawler to be picked up by the wind and blown on to nearby trees. Most crawlers remain on the same tree and simply migrate to new needles. By early August, crawlers settle on a needle and are transformed into immobile nymphs with shells. Scales will feed on pine needles during the winter and spring months whenever temperatures warm.

Infestation Characteristics:

In eastern Oregon most black pineleaf scale outbreaks are triggered by man made disturbance such as pesticide drift or excessive dust from roads. An increasing number of scale outbreaks have been occurring in pine and Douglas-fir stands



Figure 1: Pines defoliated by black pineleaf scale in a residential setting.

Photo: Rob Flowers ODF



Photo: Ladd Livingston, IDL, Bugwood.org

Figure 3: Adult black pineleaf scales are approximately 1.5-mm in length.

on poor growing sites at low elevations (2,000 - 3,500 ft) and do not appear associated with dust or pesticides.

The severity of a scale infestation can be judged by counting the number of scale per inch of needle. Non-damaging or endemic scale populations have densities of less than 0.5 scale per inch of needle. Growth loss occurs when needles have greater than 4 scale per inch of needle, and a high probability of tree mortality occurs when needles have greater than 20 scale per inch. Most scale outbreaks cover small areas, but these have the potential to grow to large areas and may persist for many years.

Control:

If a scale infestation is attributable to insecticide drift, the outbreak may subside when spraying is discontinued and parasite and predator populations recover. If spraying is continued, the scale outbreak will intensify and may result in tree mortality.

Natural

Several species of parasitic wasps and ladybird beetles control black pineleaf scale populations under most conditions. Weather also plays an important role in regulating scale populations. If scales are not gradually conditioned to cooler temperatures, a rapid freezing event can dramatically lower survival.

Cultural

Increasing tree vigor by reducing competition or increasing irrigation may lead to a greater tolerance of scale infestations.

Insecticides:

Forests

Aerial application of a contact insecticide must be timed for the brief period in July when crawlers migrate to new needles. Due to the difficulty in obtaining complete coverage and the potential impacts to natural enemies, this is generally not recommended.

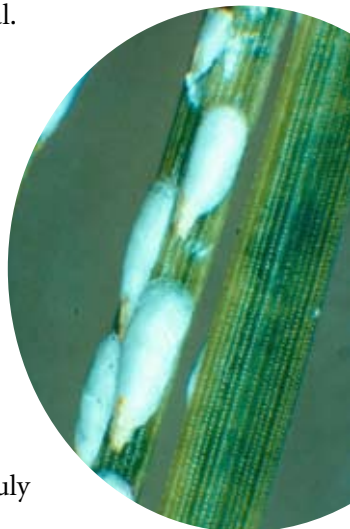


Photo: Tim Tigner, VDE, Bugwood.org

Figure 4: Another scale, *Chionaspis pinifoliae* or pine needle scale, is frequently found on trees infested by black pineleaf scale. Pine needle scale is white and 2.5-mm in length.

Ornamental Trees

Ground applications of contact insecticides must be timed for the presence of the crawler stage. After crawlers have settled on new needles and developed a shell, application of contact insecticides will be ineffective. Contact insecticides registered for controlling scale include carbaryl and fenoxycarb.

Trunk injection or soil drench application of systemic insecticides can be effective at reducing scale populations. Trunk injections of imidacloprid should be made in the fall, while soil drench applications should be done in early spring to allow sufficient time for uptake.



Photo: Dave Overhulser, ODF

Figure 5: The shell of a black pineleaf scale is lifted to show tiny yellow crawlers before migration to new needles. Crawlers are only 0.3-mm in length and difficult to see without a hand lens.

Remember, when using pesticides, always read and follow the label.

For further information about the Oregon Department of Forestry's Forest Health Program,

Call or write to:

Rob Flowers, Forest Entomologist
(503)945-7396
rflowers@odf.state.or.us

Alan Kanaskie, Forest Pathologist
(503)945-7397
akanaskie@odf.state.or.us

Oregon Department of Forestry
2600 State St, Bldg D, Salem, OR 97310

www.oregon.gov/ODF/PRIVATE_FORESTS/fh.shtml