Cryptomeria Scale

Aspidiotus cryptomeriae Kuwana

Chlorotic damage from Cryptomeria scale feeding on the undersides of needles. *Courtesy of Sandy Gardosik, PDA*

Hosts

- True firs, especially Fraser, Canaan, and balsam
- All other conifer species

Damage Potential

- Moderate–high

Symptoms and Signs

- Damage to denser, lower, and inner branches of the tree
- Mottled yellowing on needle tops
- Premature needle drop

Causes of Similar Symptoms

- Elongate hemlock scale
- Spruce spider mite

Identification

Cryptomeria scale is an armored scale found on the underside of needles. Observed with a hand lens, the scale resembles a fried egg. The yellow, soft-bodied scale insect is protected beneath a whitish-gray, oval cover. Yellow, cast skins of the immature scales can be seen centrally under the translucent scale cover. The scale covering is the structure most frequently observed and will easily slough off when rubbed with your finger. When the scale covering is removed, it frequently leaves a solid green ring on the white stomata on the needle. The female covering is about 1/20 inch (1.0–1.5 mm) long and the immature male covering is slightly smaller. Underneath the covering, the adult female scale is a yellow, flattened oval that lacks legs or a distinct head. Prying the insect from the needle may reveal the extremely long, thin mouthparts inserted in the needle. Adult male scales are winged and rarely seen. Eggs deposited under the female covering are oval and yellow. The pale yellow, lozenge-shaped crawlers are about 1/100 inch long (0.25 mm) and visible to the naked eye after they have moved from under the female cover.

Biology and Life Cycle

All stages of Cryptomeria scale are found on the underside of needles. The crawlers and males are the only stages capable of moving about on the needles. All other immature stages and the females are sedentary, remaining on the site where they first inserted their piercing-sucking mouthparts to feed (Fig. 1). This feeding causes chlorotic spotting on the needles (Fig. 2), which may give an infested tree a yellow appearance beginning at its base (Fig. 3).

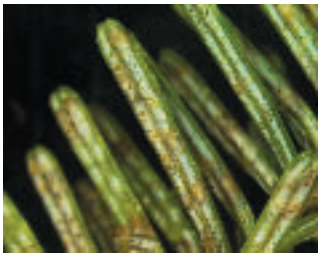

Figure 1. Heavy infestation of mature Cryptomeria scales. *Courtesy of Sandy Gardosik, PDA*

Figure 2. Chlorotic damage from scale feeding. *Courtesy of Cathy Thomas, PDA*

Figure 3. Yellowed trees with Cryptomeria scale damage. *Courtesy of Cathy Thomas, PDA*

Calendar of Activities

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Symptoms	■	■	■	■		■	■	■	■	■	■	■
Monitor					■	■		■				
Mechanical Control	■	■	■	■							■	■
Spray Control						■		■				

Figure 4. Adult male Cryptomeria scale emerged from its scale covering. *Courtesy of Sandy Gardosik, PDA*

Figure 5. Adult female scale without its scale covering and other mature scales. *Courtesy of Sandy Gardosik, PDA*

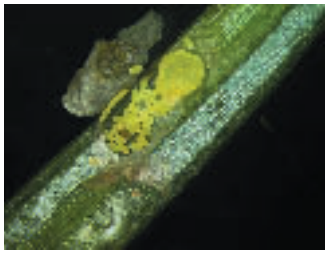

Figure 6. Exposed female scale with eggs. *Courtesy of Sandy Gardosik, PDA*

After overwintering as immatures, the scales resume feeding and mature by late April. Males have an additional nonfeeding pupal stage before the winged male (Fig. 4) emerges and flies to a female (Fig. 5). With the female under her protective cover, mating occurs and the male dies. Females deposit approximately 40 yellowish eggs beneath the cover before dying by late May or early June (Fig. 6). Crawlers emerge about 2 weeks after the eggs are deposited. The crawler emergence period may extend for 6–7 weeks but generally peaks about 2–3 weeks after eggs are laid.

Crawlers are relatively fragile and desiccate quickly (Fig. 7). They can crawl short distances but must settle and begin to feed within a day of emerging from the egg. As they settle and begin to feed, they create the waxy covering to protect themselves from environmental conditions (Fig. 8). It is not uncommon to find a settled crawler beginning to develop its protective covering under the dead female. Several layers from different generations may develop with continual infestation.

Figure 7. Crawler (circled), settled crawlers, female, and eggs. *Courtesy of Sandy Gardosik, PDA*

Figure 8. Settled scale crawlers. *Courtesy of Sandy Gardosik, PDA*

In summer, the stages repeat and by late July or early August, eggs of the second generation are present. The second-generation crawlers begin to emerge in mid-August, but some crawlers may be present into October. Two generations occur, but not all individuals mature at the same time, so the generations are not as distinct as some other multiple-generation pests.

Monitoring and Management Strategies

Plantation Establishment

- Plant tree varieties that are less susceptible to Cryptomeria scale infestations.
- Weed management in rows is important since it permits easier scouting and more thorough coverage if chemical controls are needed.

Preseason

- Scout for scale insects on the underside of needles, particularly those on the inside of bottom branches. Look for trees that exhibit yellow mottling on the upper surface of the needles (Fig. 9). If scale insects are found, verify that it is Cryptomeria scale by comparing the description with that of elongate hemlock scale. Male elongate hemlock scale coverings are white.
- Scouting on an overcast day will allow symptoms to stand out.
- Place sticky cards on branches showing symptoms to trap adult male scale insects (Fig. 10). Their emergence signals that eggs will soon follow.

Figure 9. Lifting lower tree branches to scout for Cryptomeria scale. *Courtesy of Cathy Thomas, PDA*

Figure 10. Sticky cards for monitoring adult male scale emergence. *Courtesy of Cathy Thomas, PDA*

- If only a few trees are infested, remove and destroy the trees before bud break.
- If the block is generally infested, tag several trees that can be easily observed for crawler emergence.

Growing Season

- Growing degree days:
  - First-generation crawlers begin to emerge at 600–800 GDDs.
  - Second-generation crawlers begin to emerge at 1,750–2,130 GDDs.
- Threshold level: Currently, no threshold level has been established. Cryptomeria scale can cause damage with just a few scales per needle.
- Scout tagged trees for egg deposition in late May, and then scout daily for first crawlers. Repeat scouting regime in late summer for second generation.
- At the end of the season, evaluate results and update records.

Control Options

Biological

- Encourage naturally occurring parasitoids and predators.
- Do not use a broad-spectrum insecticide that will kill beneficial insects.

Mechanical

- Remove and destroy heavily infested trees before bud break. Wrap trees in a tarp/plastic when dragging them through the field to prevent transferring scales to other trees.
- Clean mower blades or tractors when moving them from an infected field to an uninfected field.
- Butt-prune infested trees to remove the most heavily infested lower branches.

Biorational

- No recommendations are available at this time.

Chemical

- Apply dormant oil in spring before bud break. Thorough coverage of underside of lower branches is important.
- For first- or second-generation control, apply an appropriate spray targeting the crawlers after they are first are seen. Repeat sprays every 7–10 days for control; up to four sprays may be required. Evaluate infested branches for presence of new crawlers after each spray to determine if another spray is necessary. Check needles from two to three seasons back for crawlers.

Next Crop/Prevention

- Purchase and plant scale-free nursery stock from a reputable company.
- Remove heavily infested trees from a field of new plantings as well as infected lower branches left behind after tree cutting.

Cyclaneusma Needle Cast

Cyclaneusma minus (Butin) DiCosmo, Peredo, and Minter (syn. *Naemacyclus minor* Butin)

Yellow-brown needles on infected tree. *Courtesy of USDA Forest Service, Forest Health Protection, St. Paul Archive, Bugwood.org (#5050051)*

Hosts

- Pines, esp. Scotch
- Also reported on Austrian, Ponderosa, Mugo, and Monterey pines

Damage Potential

- Moderate

Symptoms and Signs

September Through November

- Light green spots that eventually become yellow on needles 2 years old and older
- Yellow needles with transverse brown bands

October Through May

- Symptomatic needles anywhere on the tree or cast to the ground
- Off-white fruiting bodies that develop on yellow needles and swell with wet weather, making them easier to see

Causes of Similar Symptoms

- Aphid feeding
- Other needle casts such as *Lophodermium*, *Lophodermella*, and *Dothistroma*
- Environmental stresses
- Air pollution
- Fall needle drop
- Winter injury
- Pine needle scale

Identification

Cyclaneusma needle cast is commonly referred to as the "fall yellower" of Scotch pines because of the timing and appearance of initial symptoms. Symptoms appear on older, interior needles from 10 to 15 months after infection occurs. In late summer or early fall, infected needles will have light green to yellow spots reminiscent of aphid or scale insect feeding. Gradually, these yellow spots enlarge to form yellow bands, eventually causing the entire needle to turn yellow. By winter, the needles are light tan, and brown transverse bands become visible. Infected needles remain on the tree through the winter. Fruiting bodies form about one month after symptoms appear. Because they are off-white in color and similar to the surrounding diseased tissue, they are difficult to detect. These structures become more obvious during periods of moist weather when they swell and split the epidermis of the needle, causing it to look like two open doors.

Because many needle casts are similar, laboratory diagnosis may be warranted for proper identification before applying a fungicide.

Biology and Life Cycle

Cyclaneusma needle cast causes many pine species to prematurely defoliate. Some research suggests that this fungus may be an opportunistic pathogen that causes disease on plants that are under environmental stress. Four periods of infection occur for this fungal disease. The first is from mid-July through August, when the current year's needles may become infected. September through November and late November through early December are the second and third infection periods. In Pennsylvania, these three periods account for about half of the new infections. The remaining 50 percent of infections occur from April through June, when both mature needles and new growth are susceptible.

Spores are dispersed by the wind as they are released by fruiting bodies. If proper moisture is present, the fungus will enter the needle through stomata. About the time needles become discolored with brown bands, fruiting bodies will develop beneath the surface of the needle (Fig. 1). They begin to swell and the epidermis of the needle opens with a longitudinal fissure (Fig. 2). When moist or wet, the fruiting bodies enlarge and forcibly discharge spores.

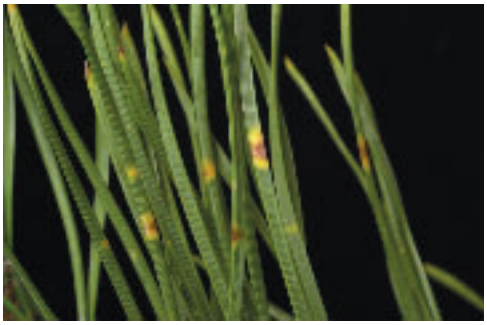

Figure 1. Yellow-brown bands on infected Scotch pine needles. *Courtesy of Tracey Olson, PDA*

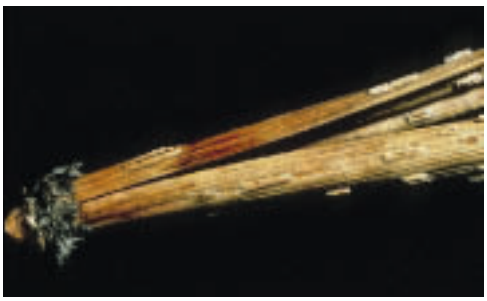

Figure 2. Swollen, light brown fruiting bodies that will rupture the surface of the needle. *Courtesy of Joseph O'Brien, USDA Forest Service, Bugwood.org (#5050047)*