

2013 Pest Report

Needle Cast Damage



In 2013, defoliation from needle cast fungi impacted Lodgepole pine across the northeastern edge of the Intermountain Region. Areas reporting damage include the Bridger-Teton National Forest, Grand Teton National Park, Wasatch-Cache, Ashley, Caribou and Targhee National Forests. This disease caused notable damage as far north as the Gallatin National Forest in Montana this year. Lodgepole pine needle cast mostly impacts sapling to pole sized trees, but when large stands of smaller trees are present it can cause damage over a wide area. The disease rarely kills large trees, but in some locations, the defoliation has been persisting for up to 3 or 4 years, a condition which may result in mortality of some trees particularly if damage is again present in 2014, particularly in the smaller size classes.

Needle cast fungi share similar biology, but differences in their life cycles can help determine which particular disease-causing fungus is present. The basic biology shared by needle cast fungi includes:

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1. The fungi infect needles, which die early, are retained on the tree for a variable amount of time, and are cast (early needle drop) the following summer or fall.
2. The disease cycle (See Figure 5, Appendix) usually takes one year, but can in some cases take multiple years.
3. Most of the pathogens have similar morphological features.
4. They usually require free moisture in the form of mist, fog, or rain on the foliage to cause infection. Therefore, infection is usually more severe in moist areas.
5. Fruiting bodies of the fungi involved develop on the needles and mature in time to be dispersed when the next generation of needles is susceptible.

The primary culprit in the current defoliation is the forest pathogen, *Lophodermella concolor*. The symptoms most frequently observed with this disease are browning and casting (early needle fall) of infected needles from the previous year (Figure 1). This commonly appears as branches with green tips and brown or missing needles from previous years.

Figure 1a & b. Typical symptoms of *Lophodermella concolor* needle cast.



Current year's needles are usual asymptomatic even if they are infected. If trees are infected for more than one year, the tree can develop a "lion's tail" appearance characterized by green tips on the branches with little or no needle retention from previous years (Figure 2).

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Figure 2. Lion's tail appearance of a tree defoliated at least 2 years. The green tips are currently expanding needles from 2013. The brown needles are last year's growth, and have been killed by the disease. Needles from previous years are missing.

The confirming symptoms for this pathogen are browning of previous years needles, as described above, and small sunken spore-bearing structures (ascomata, Figure 3).

Figure 3. Sunken ascomata typical of *Lophodermella concolor*.



Another pathogenic fungus sometimes contributes to the needle damage we are currently seeing is *Lophodermella montivaga*. In some cases, it appeared that in some current foliage was infected, and that the needles were banded and had raised rather than

sunken ascomata (Figure 4). Identification was further confused by the presence of secondary fungi in some cases.

Figure 4. Damage caused by *Lophodermella montivaga*.



Summary and management implications

In most cases, the damage we are currently seeing has only been occurring for 1 to 2 years. It is however, quite widespread if somewhat spotty, covering several mountain ranges and National

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Forests. In some instances, it appears damage has been continuing for 3+ years, and in these cases, some mortality of small, stressed trees may occur. The two fungi involved have very similar moisture requirements, but require moisture at slightly different times of the year (Appendix). *L. concolor* needs moisture in the early summer to infect, and *L. montivaga* needs late summer to early fall moisture. The latter condition of moist needles in the fall should be a less common condition in our climate, perhaps leading to less incidence of *L. montivaga*.

The epidemic is patchy, with more heavily infected areas often surrounded by non- or lightly-infected areas. We suspect more heavily infected areas retain moisture at the appropriate time of the year, but host susceptibility may vary as well.

Needle cast disease is unlikely to impact most management objectives over the long term, but growth loss from heavy defoliation might cause some concern in areas where rapid growth of young lodgepole pine stands desired. Direct control of these diseases is not practical or even desirable in almost all cases, but recognition of the damage may aid in long term planning.

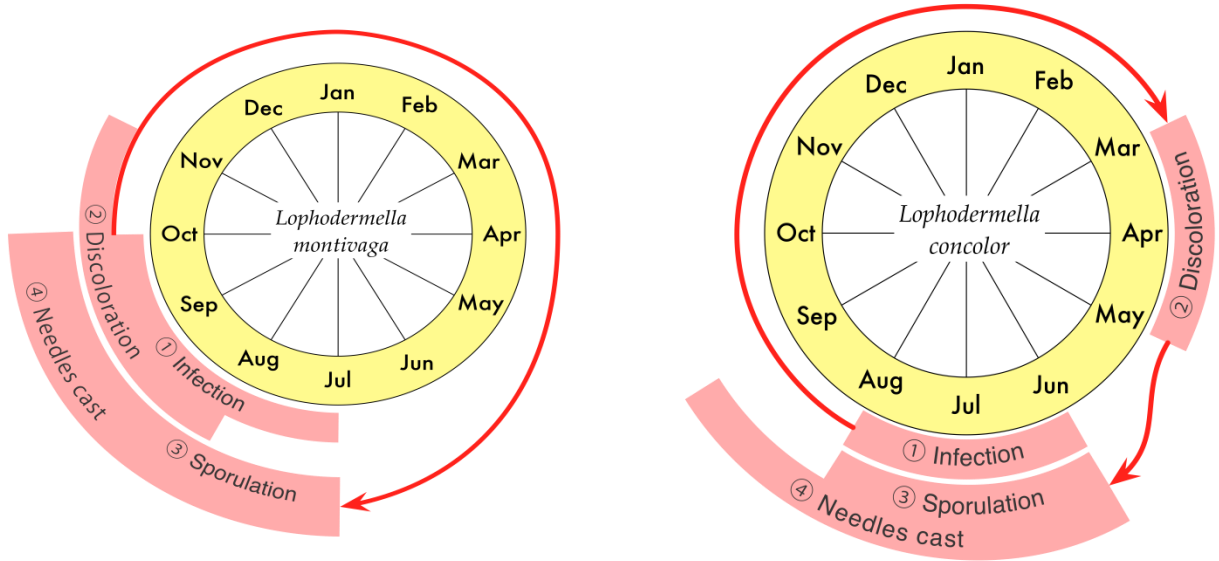
An excellent review of these diseases and their biology can be found at:

<http://www.forestpathology.org/pdfs/worrall2012needlecast.pdf>

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Appendix.



Life cycles of *Lophodermella concolor* and *L. montivaga*. Source: <http://www.forestpathology.org/pdfs/worrall2012needlecast.pdf>, used with permission of the author.