

Davisomycella and Lophodermella Needle Casts

Occasionally epidemic diseases of pines

Pathogen—*Davisomycella* is a genus of needle-cast pathogens in the family Rhytismataceae, order Rhytismales. In the Rocky Mountain Region, *D. (Lophodermium) ponderosae* infects ponderosa pine; *D. (Hypodermella) medusa* infects both ponderosa and lodgepole pines.

The related genus *Lophodermella* also contains several pathogens that are occasionally important in this Region. They were first described in the genus *Hypodermella* and occur in older literature under that name. *Lophodermella arcuata* occurs on limber pine, *L. cerina* occurs on ponderosa pine, and *L. concolor* and *L. montivaga* occur on lodgepole pine.

Hosts—Ponderosa, lodgepole, and limber pines can be infected by different species and combinations of species of *Davisomycella* and *Lophodermella* (see “Pathogen” above).

Signs and Symptoms—These fungi cause browning and premature casting of needles. Symptoms of *Davisomycella* species may appear on needles of any age class except current-year needles (fig. 1). Whole needles or portions may be affected. After symptoms appear, fruiting structures (hysterothecia) may begin to form. In *D. ponderosae*, they begin to form in spring and mature in summer. Hysterothecia are dark brown and elliptical to linear; they may be partly fused end-to-end, forming long, sometimes sinuous or forked lines (figs. 2-4). They open by a longitudinal slit and release spores into the air during wet weather. Hysterothecia of *D. medusa* are also dark and raised but are considerably shorter. They occur in greenish straw-colored areas of the needle. As older needles are lost and only current needles are present, twigs may take on a lion’s tail appearance.

With *Lophodermella concolor*, needles infected the previous year die and turn reddish brown by spring, becoming straw-colored during the summer. Hysterothecia are colorless (the specific epithet means that they blend with their background). They are usually evident as shallow, elliptical depressions up to 1/25 inch (1 mm) long.



Figure 1. *Davisomycella ponderosae*: discoloration and needle loss to large, open-grown ponderosa pines. Photo: Jim Worrall, USDA Forest Service.

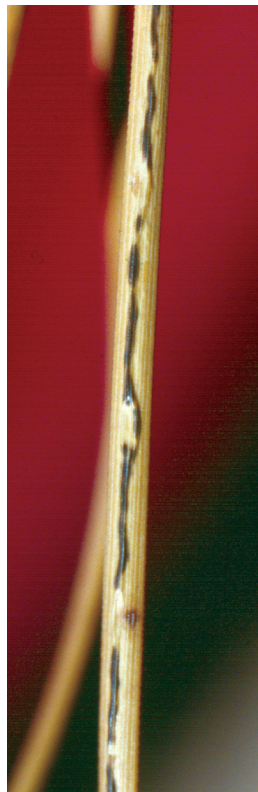


Figure 2. *Davisomycella ponderosae*: immature hysterothecium in late May. Photo: Jim Worrall, USDA Forest Service.



Figure 3. *Davisomycella ponderosae*: mature, open hysterothecia in early October following wet weather. Photo: Jim Worrall, USDA Forest Service.



Figure 4. *Davisomycella ponderosae*: another view of mature, open hysterothecia in early October following wet weather. Photo: Jim Worrall, USDA Forest Service.

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Disease Cycle—The disease cycles of *Davisomycella* needle casts are somewhat unusual. Primarily current-year needles are infected after hysterothecia mature in late summer. As with most foliage diseases, wet weather is required for spore dispersal and infection. Symptoms may not appear the next year; in fact, the needles may appear healthy and may be retained for the normal time. This is a latent infection. Evidence suggests that symptom development is triggered by drought stress. When drought occurs, any age classes of needles that were infected (i.e., had suitable weather conditions and inoculum during their first year) may develop symptoms.

Disease cycles of *Lophodermella* needle casts vary somewhat (table 1). *Lophodermella concolor* and *L. montivaga* have a 1-year cycle. Infection occurs in current-year needles in early or late summer, respectively. No symptoms develop until late winter. By spring, infected needles are dead (figs. 5-6). Hysterothecia develop in them and mature in early or late summer, after which needles are cast.

Table 1. *Davisomycella* and *Lophodermella* species that cause needle cast in the Region (includes hosts and phenology).

Pathogen	Host	Dispersal period	Symptoms appear
<i>Davisomycella medusa</i>	Lodgepole, ponderosa	July-September	Following year to not at all
<i>Davisomycella ponderosae</i>	Ponderosa	July-October	Following year to not at all
<i>Lophodermella arcuata</i>	Limber	July-August	Following spring
<i>Lophodermella cerina</i>	Ponderosa	Spring	Beginning that autumn
<i>Lophodermella concolor</i>	Lodgepole	June-July	Following spring
<i>Lophodermella montivaga</i>	Lodgepole	July-September	Beginning that autumn

Impact—Epidemics of needle casts are sporadic. Damage may be severe and widespread in some years, while infections may be hard to find in others. Nearby trees may contrast greatly in infection levels, suggesting genetic variation in resistance. Often, damage is most severe on smaller trees, in the lower crown of larger trees, and in dense stands. However, damage is sometimes severe throughout the crown of large, open trees. Growth losses have been documented for needle casts and can be significant with successive years of infection. During an epidemic of *Davisomycella medusa* associated with drought, 10-year growth of infected trees was reduced by 69%, while growth of uninfected trees was reduced by only 29%. As noted above, *Davisomycella* species may be most damaging when drought follows a year that is favorable for infection.



Figure 5. *Lophodermella montivaga*: discoloration of sapling lodgepole pine. Photo: Leanne Egeland, USDA Forest Service.



Figure 6. *Lophodermella montivaga*: single shoot showing symptoms and fruiting on last year's needles in late June. Photo: Leanne Egeland, USDA Forest Service.

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Management—Direct management approaches are not known for needle casts and are generally not needed. Growth impacts are usually localized and temporary. Thinning may be helpful where epidemics recur frequently enough to cause concern in high-value forests. Thinning would speed drying of the foliage, thereby reducing the periods available for infection. Also, growth increases associated with thinning may compensate for reductions caused by the disease.

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4. Worrall, J.J.; Sullivan, K.F. 2002. Discoloration of ponderosa pine on the San Juan National Forest, 1999-2001. Biological Evaluation R2-02-06. Lakewood, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Region, Forest Health Management. 20 p. Online: http://www.fs.fed.us/r2/fhm/reports/be_r2-02-06.pdf.

