Insect and Disease
Management Series
2004
WEB July 2010

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**Management Guide for**

# Larch Needle Blight

***Hypodermella laricis* Tub.**

Western larch trees of all ages and sizes are infected by this pathogen

## Topics

| | |
|---|---|
| Impact | 1 |
| Infection process | 2 |
| Control Strategies | 2 |
| Life History | 3 |
| History of Epidemics | 4 |
| Other Reading | 5 |
| Field Guide | |
| Management Guide Index | |

**Key Points**

- Impact is rarely as significant in the long term as it appears during an outbreak.
- Select for resistance during precommercial thinning.
- Select resistant seed trees.
- Protect ornamentals and nursery stock with well-timed fungicide treatments.

## *Three main types of impact*

In years of severe outbreaks of larch needle blight, trees of all sizes may be affected. Defoliation varies from slight in some trees to complete in others. In larger trees, most infection occurs in the lower two thirds of the crown. Severe infections occurring in two or more years in succession can result in significant impacts, especially in young trees.

1. **Growth loss** resulting from severe infection is the most common effect.

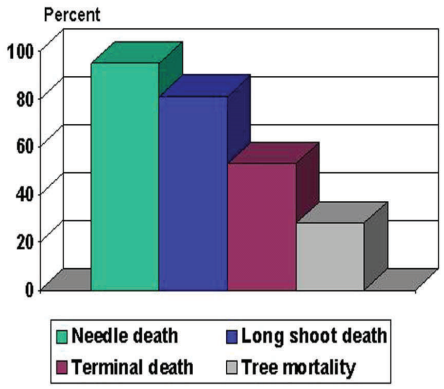
2. **Terminal shoot death** results in direct loss of height growth and may result in double-leader formation.

3. **Some seedlings may be killed** after two or three successive years of severe defoliation.

Based on artificial defoliation trials (Graham 1931), radial growth loss may be roughly proportionate to the amount of defoliation.

A single year's infection weakens spur shoots as evidenced by late bud burst, fewer leaves per spur, stunting and chlorosis of foliage (Weir 1912, Cohen 1967).

Spur shoots often are killed by two successive years' infection by *Hypodermella* (Cohen 1967). Long shoot mortality with resulting loss in height growth occurs when long shoots are heavily infected (Weir 1913).




Damage to wild western larch seedlings in the second year of a larch needle blight outbreak on Red Ives Ranger District, northern Idaho, in 1981. Percent of foliage, long shoots, terminals and trees killed.

## It's all a matter of timing

*Hypodermella laricis* produces spores in the spring. If the timing of spore maturity coincides with prolonged periods of rain to help with the release of spores and with larch foliage being at their susceptible, immature stage of growth, an epidemic may be in the making. If there is also an abundance of spores resulting from infections in the previous season, the epidemic may be severe.

In spring, foliage typically begins to emerge first on the spur shoots. Long shoot elongation follows bud break with individual needles produced at intervals along the immature shoot.

The differences in timing of foliage production on the two types of shoots can result in much different levels of infection.

**Long and short shoots**

Western larch produces long shoots and short (spur) shoots.

Long shoots are responsible for height growth and branch extension.

Spur shoots bear the majority of the foliage.

## Control Strategies

Impact is rarely as significant in the long term as it appears during an outbreak. Consideration should be given to the probability that control is not warranted. The control method selected should match the setting.

Considerable variation in susceptibility to *H. laricis* is evident in native populations of larch.

**In the forest,** silvicultural controls are recommended, emphasizing enhancement of natural resistance of some larch trees to infection by *Hypodermella*.

- Select for resistance during precommercial thinning. To some extent this will happen by default when the better-growing trees are selected as leave-trees.
- Select resistant seed trees.

**In ornamentals and nurseries,**

- *Hypodermella laricis* (larch needle blight) is rarely observed in nursery settings. (*Meria laricis*, the cause of larch needle cast, is common and very damaging in *Larix* species in nurseries.) Ornamentals can be protected with fungicide treatments.
- Chlorothalonil, generally under the trade name Bravo®, is commonly used to control needle diseases on ornamentals and in nurseries. **Always follow label instructions carefully when using chemicals.**
- Spray to protect foliage from *H. laricis* just prior to bud break. Reapplication may be necessary after rain. Protect the foliage for two weeks after needles emerge.

**Disease Resistance**

Allow nature to select for disease resistance or incorporate disease resistance into your tree improvement program.

## *Life History*

Leaves (needles) that were killed in the previous season, are the inoculum source for the fungus. *Hypodermella laricis* produces a plant hormone (indoleacetic acid) that inhibits formation of an abscission layer (Cohen 1967). This prevents normal leaf abscission and allows the fungus to fruit the following season on leaves still attached to the spur. Fruiting bodies will be produced in this way for as long as two years.

The spores of *H. laricis* are mature in February in western Montana (Cohen 1967). During spring rain, usually in mid-April or early May, the walls of the hysterothecium(Figure 1) absorb water and split the fruiting body open length-wise exposing the asci containing the spores.

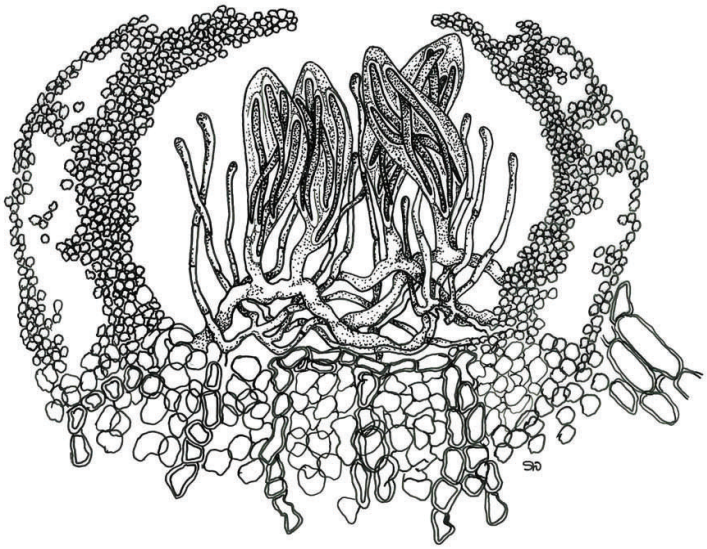
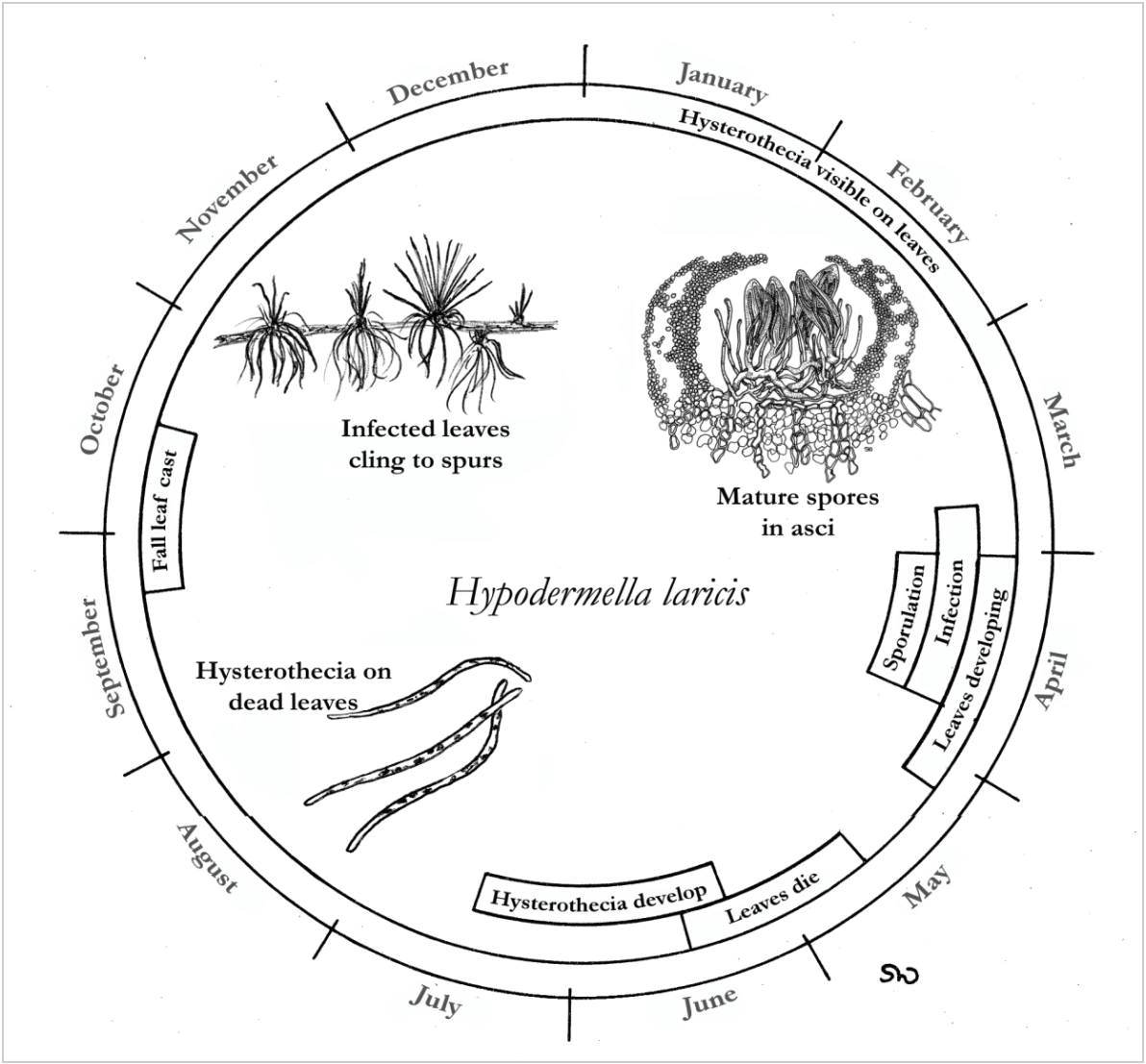


Figure 1. Hypodermella laricis is an Ascomycete of the order Phacidiales. This drawing illustrates a cross-section of the fruiting body. Elongate spores are contained within sac-like asci inside the cavity of the black hysterothecium on the undersides of leaves.



## *Life History (continued)*

**The process of leaf death may take only three days, giving the appearance that entire stands of larch have suddenly died.**

**Timing for infection is important**

The asci burst open and the spores are released. If the larch buds have begun to open and the leaves are exposed, the spores that land on the leaves will germinate and penetrate the leaf surface. By two weeks following bud break, leaves are much more resistant to infection. Thickening of the waxy outer cuticle of the foliage apparently prevents penetration by hyphae of the germinating spores (Garbutt 1985). If rainfall does not coincide with early leaf growth, few of the spores will survive to infect.

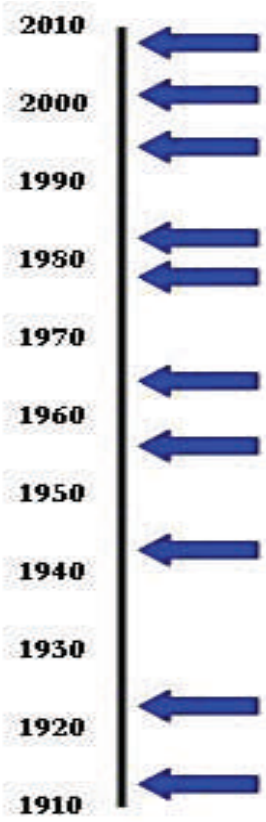
**Symptom development**

Approximately a month following infection, usually mid-May to mid-June, the needles turn brown and droop, remaining attached to the spur shoots. Spur shoots are not invaded by Hypodermella (Cohen 1967), but it is uncertain whether long shoots become infected.

Elongate, black fruiting bodies appear on the undersides of leaves in July or August. Spores within them are still immature in October. By January, however the spores have matured and are ready for above-freezing temperature and rain in the spring (Cohen 1967).

**Previously-infected shoots continue to bear symptoms**

When buds resume growth in the spring, differences become apparent between spur shoots which bore infected leaves the previous year and those which did not. Buds which had borne infected leaves open later than uninfected buds. The leaves produced on the shoots that were infected the previous season will remain dwarfed to half or less the length of normal leaves, and there are fewer leaves per shoot (Cohen 1967). The dead leaves may remain attached to spur shoots for a year or two.




**Significant epidemics of larch needle blight in Idaho and Montana.**

## *A History of Epidemics*

Epidemics have been reported about every decade in northern Idaho, western Montana, and southern British Columbia. Weir (1913) indicated that during 1912 and 1913 severe larch needle disease occurred in Idaho and Montana. Schmitz (1923) reported severe defoliation in 1922 as a culmination of about five years of heavy infection in Idaho and Montana. Ehrlich (1942) reported severe infections in Idaho in 1941 and 1942 and Cohen (1967) reported that 1956 was a heavy infection year in Montana. Severe *H. laricis* infections were observed in aerial survey flights of northern Idaho and western Montana in 1964 and 1965 (USDA Forest).

A 1978 epidemic in northern Idaho was reported to have been primarily *Meria laricis* although high levels of damage from *H. laricis* also was observed that year (USDA Forest Service). Aerial survey in Idaho and Montana again detected severe infections in 1980, 1981, 1993 and 2002-2003 (USDA Forest Service).

## Other Reading

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USDA Forest Service. Forest Insect and Disease conditions in the Northern Region. Northern Region, Forest Health Protection. Annual Reports for 1978-2003.

Weir, J. R. 1913. An epidemic of needle diseases in Idaho and western Montana. Phytopathology Notes 3: 252-253.

**Forest Health Protection and State Forestry Organizations**

| Assistance on State And Private Lands | Assistance on Federal Lands |
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| Montana: (406) 542-4300 | US Forest Service<br>Region One<br>Missoula: (406) 329-3605<br>Coeur d'Alene: (208) 765-7342 |
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| Wyoming: (307) 777-5659 | US Forest Service<br>Region Four<br>Ogden: (801) 476-9720<br>Boise: (208) 373-4227 |

## Publication Citation

Hagle, S. K. 2004. Larch needle blight ecology and management. Chapter 15.3. Forest insect and disease management guide for the northern and central Rocky Mountains. USDA Forest Service, Northern Region, State and Private Forestry. 5 pp.

Available from USDA Forest Service, Idaho Department of Lands, and Montana Department of Natural Resources.