

Extended Abstract

Foliage diseases on true fir (*Abies* spp.) in Norway

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Fir plantations in Norway are mainly for Christmas trees, a production situated to a large extent in western Norway, where the mild, humid climate is also ideal for fungal diseases. Thus, a number of airborne fungi causing foliage diseases on true fir (*Abies* spp.) have been found in nursery, Christmas tree, bough, and/or landscape plantings in Norway, with the most serious ones being *Botryotinia fuckeliana*, *Delphinella abietis*, *Herpotrichia parasitica*, *Melampsora abieti-capraearum*, *Phaeocryptopus nudus*, *Pucciniastrum epilobii*, *Rhizosphaera kalkhoffii* and *Sydowia polyspora* (Talgø, 2009).

Key words: *Botryotinia fuckeliana*, *Delphinella abietis*, *Herpotrichia parasitica*, *Melampsora abieti-capraearum*, *Phaeocryptopus nudus*, *Pucciniastrum epilobii*, *Rhizosphaera kalkhoffii*, *Sydowia polyspora*.

***Botryotinia fuckeliana* (grey mould, imperfect stage is *Botrytis cinerea*)**

This is mainly a problem in nurseries, but damaged shoots have also been observed in Christmas tree fields with wet conditions during shoot elongation. We have found damage by *B. fuckeliana* on subalpine fir (*A. lasiocarpa*) (Figure 1), nordmann fir (*A. nordmanniana*), Korean fir (*A. koreana*), noble fir (*A. procera*), and white fir (*A. concolor*).

Delphinella abietis

This destroys current year needles, and in severe cases entire shoots. The needles curl downwards along the edges and are usually covered by numerous, black pseudothecia. We have found the disease on subalpine fir (Figure 2), Turkish fir (*A. bornmuelleriana*), Siberian fir (*A. sibirica*), nordmann fir, and noble fir in western Norway.

***Herpotrichia parasitica* (herpotrichia needle browning)**

This kills both old and young needles. The stomatal areas of the needles get covered by brown hypha. The needles

turn greyish and hang straight down from the twigs (Figure 3), only attached by mycelium. We have seen severe damage in south western Norway on silver fir (*A. alba*) in a forest stand, and on Turkish fir and nordmann fir in Christmas tree fields.

Melampsora abieti-capraearum

This is a rust fungus on true fir needles. Goat willow (*Salix caprea*) is the alternating host. We found the fungus on nordmann fir (Figure 4) in a Christmas tree field in south western Norway.

***Phaeocryptopus nudus* (interior needle blight)**

This has been found on *A. lasiocarpa* (corkbark fir and subalpine fir) in southern Norway. It is problematic in the subalpine fir Christmas tree production. The symptoms appear approximately one year after infection, and thus the current year shoots appear healthy, while the older needles turn brown. In severe cases shoots die (Figure 5).

Pucciniastrum epilobii

This is a rust fungus that we so far have found on nordmann fir (Figure 6) and subalpine fir Christmas trees, and

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Figure 1. *Botrytis cinerea*, the anamorph stage of *Botryotinia fuckeliana*, on subalpine fir (*Abies lasiocarpa*). Photo: Venche Talgø.



Figure 2. *Delphinella abietis* on a current year shoot of subalpine fir (*Abies lasiocarpa*), dead needles are covered with black pseudothecia. Photo: Venche Talgø



Figure 3. *Herpotrichia parasitica* on Turkish fir (*Abies bornmuelleriana*) in a Christmas tree plantation. Photo: Venche Talgø.



Figure 4. Chlorotic foliage on nordmann fir (*Abies nordmanniana*) caused by *Melampsora abieticaprearum*. The underside of the needles expose whitish peridia (wall) around the aeciospores. Photo: Venche Talgø.



Figure 5. Interior needle blight caused by *Phaeocryptopus nudus* on subalpine fir (*Abies lasiocarpa*). Photo: Venche Talgø.

on noble fir in bough plantations. Damage has been observed in years with high precipitation during shoot

elongation. Willow herbs (*Epilobium* spp.) are alternating hosts.



Figure 6. Nordmann fir (*Abies nordmanniana*) with aecidia and yellow aecidiospore mass from *Pucciniastrum epilobii*. The peridia are longer than those formed by *Melampsora abieti-caprearum* (Figure 4). Photo: Venche Talgø.



Figure 7. *Rhizosphaera kalkhoffii* on Korean fir (*Abies koreana*). The black spots in the stomatal area are pycnidia. Photo: Venche Talgø.

Rhizosphaera kalkhoffii

This causes needle cast on true fir. We have found severe damage on nordmann fir, subalpine fir, and Korean fir in Christmas tree fields. Small, black, globose pycnidia cover the stomatal bands (Figure 7).

Sydowia polyspora

This is involved in two serious diseases on fir Christmas

trees in Norway and elsewhere; “*Sclerophoma* shoot dieback” (conidial stage often referred to as *Sclerophoma pithyophila*) and “current season needle necrosis” (CSNN) (conidial stage referred to as *Hormonema dematioides*). We have proven the two conidial stages to be identical. The former may kill the entire shoot (Figure 8), while CSNN gives necrotic spots and bands on new needles, often followed by severe needle cast. We have isolated the fungus from noble fir, nordmann fir, grand fir (*A. grandis*), and subalpine fir.



Figure 8. *Sclerophoma* shoot dieback on nordmann fir (*A. nordmanniana*). The black spots are the pycnidia. Photo: Venche Talgø.

REFERENCE

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