

ORIGINAL ARTICLE

Effect of slash removal on *Gremmeniella abietina* incidence on *Pinus sylvestris* after clear-cutting in northern Sweden

ANDREAS BERNHOLD¹, JESPER WITZELL² & PER HANSSON

1/ Department of Silviculture, Swedish University of Agricultural Sciences (SLU), Umea, Sweden, and 2/ Swedish Forest Agency, HOO, Sweden

Abstract

The *Gremmeniella abietina* outbreak in Sweden in 2001-2003 forced forest owners to sanitary clear-cut large areas of middle-aged *Pinus sylvestris* stands. There is, however, little knowledge of effective reforestation of *P. sylvestris* on *G. abietina*-infected sites. *Gremmeniella abietina* disease incidence on *P. sylvestris* seedlings planted in 2003 was studied with and without (control) removal of infected *P. sylvestris* slash. Removed slash was piled in stacks around the regeneration plots. The seedlings were planted within 1 year after sanitation felling on three sites in northern Sweden. One year after planting, *G. abietina* pycnidia were found on 32% of the control seedlings and total infection, including stem cankers, reached 44%. Total and *G. abietina*-induced mortality was 15 and 10%, respectively. The method of removing and piling the infected slash reduced, in relation to control, the number of infected seedlings by 50% and seedling mortality by 27% 1 year after planting, compared with control. Consequently, even if there is a clear sanitation effect of removing infected slash to the sides of the regeneration area, it does not eradicate the infection source from the stands. Postponed planting, slash burning or complete removal of the infected slash is needed to minimize the infection risk. The positive correlation found between slash coverage and infection rate indicates that clear-cuts with large amounts of infected slash should be given priority for slash treatment.

Keywords: *Disease, infection, pycnidia, regeneration, sanitation, Scleroderris canker.*

Introduction

In Fennoscandia, the pathogen *Scleroderris canker*, *Gremmeniella abietina* (Lagerb.) Morelet, severely damages native *Pinus sylvestris* L. and introduced *P. contorta* var. *latifolia* Engelm. by killing young shoots and buds and by causing stem cankers (Roll-Hansen, 1964; Kurkela & Norokorpi, 1979; Hellgren & Barklund, 1992; Karlman et al., 1994; Witzell, 2001). Two types of *G. abietina* have been recorded in Sweden: large tree type (LTT) and small tree type (STT) of the European (EU) race (Hellgren & Hogberg, 1995). Historically, LTT *G. abietina* has been confined to southern and central Sweden, infecting *P. sylvestris* of all ages and advanced growth of *Picea abies* (Barklund & Rowe, 1981; Hellgren & Barklund, 1992), whereas STT *G. abietina* has been confined to northern Sweden, mainly damaging young *P. contorta* and *P. sylvestris* plantations on high-elevation sites

(Karlman, 1986; Karlman et al., 1994; Hamelin et al., 1996; Hansson et al. 1996). The most severe *G. abietina* epidemic in Sweden so far was caused by LTT *G. abietina* and took place in 2001-2003. According to the Swedish National Forest Survey, at least 484,000 ha of middle-aged, pine-dominated forests were infected (Wulff et al., 2006). Unlike

We are unable to supply this entire article because the publisher requires payment of a copyright fee. You may be able to obtain a copy from your local library, or from various commercial document delivery services.