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Survival and vitality of *Gremmeniella abietina* on *Pinus sylvestris* slash in northern Sweden

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Summary

Survival and vitality of *Gremmeniella abietina* on *Pines sylvestris* slash was studied in northern Sweden during 2003 and 2004. Once a month between September 2003 and April 2004, two to three trees were cut down and debranched. Shoots with pycnidia were sampled at the felling date and then at every consecutive month. The percentage of germinated conidia from each shoot was calculated after 24, 48 and 72 h incubation. The vitality of G. *abietina* pycnidia in the slash remained high the whole period. Intact pycnidia were found on slash several months after the time of conidial sporulation, which indicates that new pycnidia may he produced on dead pine branches. Sampling of shoots from slash on 13- to 18-month-old clear-cuts showed conidial germination capacity as high as in pycnidia collected in fresh slash. Due to survival of G. *abietina* in slash it is recommended to postpone planting of *P. sylvestris* seedlings in northern boreal areas to the third vegetation period after sanitary clear-cuts.

Introduction

The parasitic fungus *Gremmeniella abietina* (Lagerb.) Morelet is the causal agent of *Sderoderris* canker on conifers in Europe, North America and Asia, and a common pathogen in Scandinavia. During epidemics it causes severe damages on native *Pinus sylvestris* L. and introduced *Pinus contorta* var. *latzfolia* Engelm. by killing young shoots and buds and by causing necroses on the stem resulting in cankers (ROLL-HANSEN 1964; KURKFLA and NOROKORPI 1979; HELLGREN and BARKLUND 1992; KARLMAN et al. 1994; WITZELL 2001).

The European race of G. *abietina* has been separated into three types based on random amplified polymorphic DNA (RAPD) profiles (HAMELIN et al. 1996). Two of these types have been recorded in Fennoscandia: type A and B (UOTILA 1983, 1992), or large tree type (LTT) and small tree type (STT; HELLGREN and HOGBERG 1995). Based on immunoblotting, types A and B are confirmed to be identical to L'1 '1' and SIT respectively (PETABTO et al. 1996). Initial investigations of genetic variation in G. *abietina* in northern Sweden recorded only the northern amplitype, similar to type B or STT (HAMELIN et al. 1996; HANSSON et al. 1996). During the latest outbreak in Sweden, 2001-2003, however, symptoms on pole-sized *P. sylvestris* also in northern Sweden were similar to those earlier reported for the LTT with infections in the crown of middle-aged pines and production of pycnidia rather than apothccia (cf. UOTILA 1983; HELLGREN and BARKLUND 1992).

Three years after the outbreak in 2001, *G. abietina* was still causing severe damage in 30- to 60-year-old *P. sylvestris* stands in large areas of Sweden (S. WULFF, P. HANSSON and J. WrizELL, unpublished data). According to the Swedish National Forest Survey of the year 2003, the estimated damaged area was 484 000 ha of which 70 000 ha were severely damaged (S. WULFF, P. HANSSON and J. WITZELL, unpublished data). Thus, this epidemic

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