

Infection and spread of root rot caused by *Heterobasidion parviporum* in *Picea abies* stands after thinning: case studies on former pasture and meadow lands

Darta Klavina¹, Lauma Bruna¹, Astra Zaluma¹, Natalija Burnevica¹, Kaspars Polmanis¹, Talis Gaitnieks¹, Tuula Piri²

¹ Latvian State Forest Research Institute Silava, Rigas street 111, Salaspils, LV-2169, Latvia; e-mail address: darta.klavina@silava.lv

² Natural Resources Institute Finland (Luke), Management and Production of Renewable Resources Latokartanonkaari 9, FI-00790 Helsinki, Finland

Introduction

Afforestation of former agricultural lands is a common practice in several countries. Norway spruce *Picea abies* (L.) Karst. is one of the most frequently used conifer species in reforestation.

Spruce stands on former agricultural lands are characterized by high wood productivity but also with high infection risk of root-rot fungi *Heterobasidion* spp. after first thinning (Fig.1).

Objectives

This study investigates the spread of *Heterobasidion* root rot in three Norway spruce plantations established on former pasture and meadow lands and subjected to forest management practices.

Material and Methods

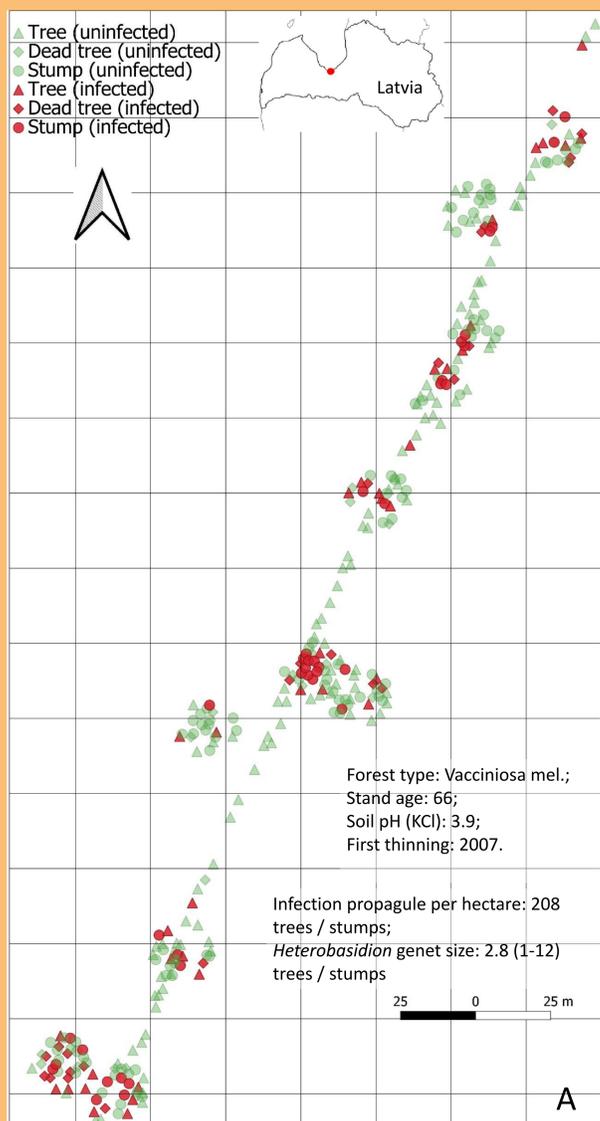
- To determine average infection rate we sampled all standing trees (157 in total) along transects within sampling areas.
- Based on transect infection rate and observed dieback over all the stands, we established circular sample plots (10m in a radius) in disease centres where all trees and stumps were analysed (Fig.2).
- Under lab conditions, presence of *Heterobasidion* spp. mycelium and conidia in those was detected and fungal isolates obtained. Species of *Heterobasidion* was determined in this stage.
- By somatic incompatibility, information about number of genets and its size was obtained.



Fig. 1. Spruce stand on former agricultural land (A) with great wood production rate (B - wood disc from spruce on former agricultural lands(30 years old)) but also root rot risk (C).



Fig. 2. Sampling of living trees and wood logs.



Results

- Transect data indicated a slightly lower infection in pastures and higher in former meadows (16 % vs. 29 and 33%, respectively).
- The average infection rate in the circular plots varied from 34 to 41%.
- All obtained *Heterobasidion* isolates were *Heterobasidion parviporum* Niemelä & Korhonen.
- Of 141 genets examined, 99 were isolated from only one tree or stump, while 42 formed genets including two or more trees or stumps indicating spread of infection through root contacts. The total number of *Heterobasidion* genets per hectare varied from 72 to 484. Results are presented in Fig.3 and indicate that disease have spread expansive within period from the first thinning (32 to 12 years ago).

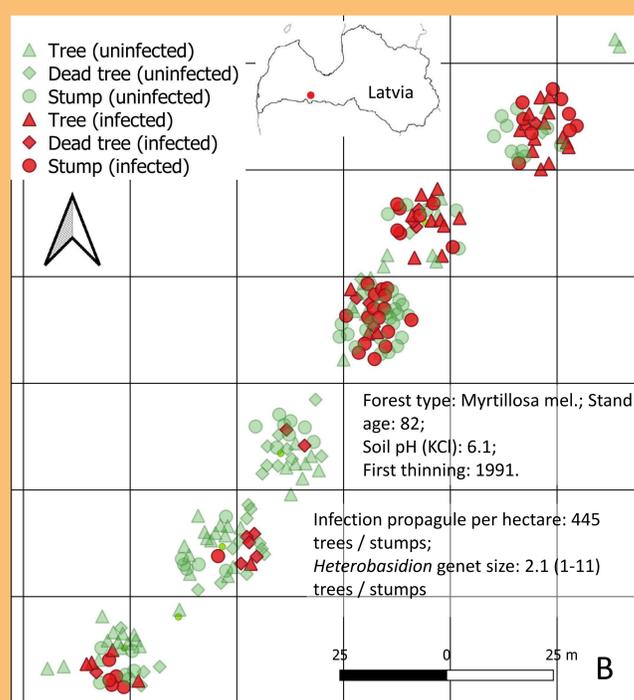
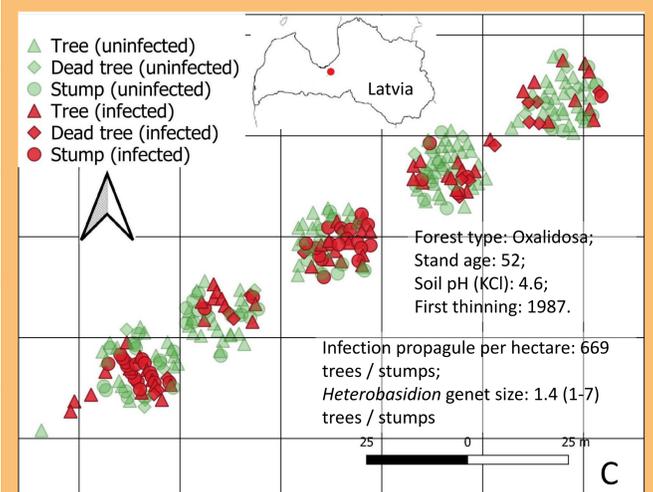


Fig. 3. *Heterobasidion* root rot infection in three Norway spruce stands on former agricultural lands (A – former pasture land; B, C – former meadows).



Conclusions

- Stands on former pastures and meadows can be highly susceptible to *Heterobasidion* infection after thinning.
- The pathogen may form expanding territorial clones in both former pasture and meadows, however in pastures territorial clones can be more expansive.
- Stump treatment is recommended to control primary *Heterobasidion* infection.