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Title

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

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Abstract

Afforestation of former agricultural lands is well established practice in several countries. It is beneficial to avoid previous-generation forest diseases and expand forest areas. However, several biotic and abiotic risks have been reported for such stands, also higher risk of *Heterobasidion* root rot after thinning. Therefore, this study investigates the spread patterns of *Heterobasidion* root rot in three *Picea abies* (L.) Karst. plantations established on former pasture and meadow lands and subjected to forest management practices. First of all, to get an insight of average infection rate we sampled all standing trees (157 in total) within transect all along sampling area. It showed slightly lower infection in pastures and higher in former meadows (16 % vs. 29 and 33%, respectively). Based on those data and observed dieback all over the stand we established circle sample plots in disease centres where all trees and stumps were analysed and average infection rate there was from 34 to 41%. All obtained *Heterobasidion* isolates belonged to *Heterobasidion parviporum* Niemelä & Korhonen. Isolates were paired to detect genotype sizes and infection origin. Of 141 genets examined, 99 were single-tree indicating primary infection and 42 formed territorial clones (160 trees and (or) stumps) indicating spread of infection through root contacts. The following conclusions were reached: ((i) on average, primary infection in such stands is essential but with a stand age secondary infection dominates; (ii) *H. parviporum* can form large (up to 137 m²) territorial clones in forests on former pasture and meadow lands causing extensive tree dieback and mortality. This study was financially supported by European Regional Development Fund's Post-doctoral Research project No. 1.1.1.2/VIAA/2/18/298 "Determining the risk of *Heterobasidion* root-rot and fungal communities in roots of Norway spruce stands on former agricultural land".

Keywords

Norway spruce, *Heterobasidion* root rot, primary infection, secondary infection, first rotation forest, afforestation.