

## NEEDLE CAST DAMAGES IN YOUNG SCOTS PINE STANDS

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**Abstract.** Climatic changes are predicted to improve the conditions for fungi, therefore increasing the probability of infection and severity of damages for forest trees. Needle cast has affected young pine stands previously and now is one of the most important threats in forest nurseries. Therefore aim of our study was to analyse meteorological conditions affecting severity of damages caused by needle cast fungi (mainly *Lophodermium* sp.) as well as genetically determined differences of Scots pine in the degree of damages by these fungi. Three series of experiments were analyzed: 1) open-pollinated Scots pine progeny trial that consists of 226 families from 13 provenances of Latvia, established in two localities (Tukums and Kalsnava). In these trials needle cast damage (in 5 grade scale) in the second growing season and survival of trees was assessed; 2) control-crossed progeny trial that consists of 72 crosses from 10 parent trees, established in two localities (Zvirgzde and Kalsnava). In these trials needle cast damage (in 5 grade scale) in the sixth growing season was assessed and tree height, height increment and diameter of root collar measured; 3) open-pollinated progeny trial, established in Daugmale, that consists of 60 families from 5 provenances of Latvia. In this trial needle cast damage (in 5 grade scale) in the third, fourth and fifth growing season was assessed and tree height, height increment measured. Degree of needle cast damages had statistically significant effect on growth (height increment) and survival. Significant effect on degree of needle cast damages was found both for genetic and meteorological factors as well as for interaction between them. The average degree of needle cast damage in open-pollinated progeny trials was  $4.7 \pm 0.01$  in Tukums,  $4.6 \pm 0.03$  in Kalsnava and from  $3.7 \pm 0.02$  at the age of 3 years to  $3.0 \pm 0.03$  at the age of 5 years in Daugmale; in control-crossed progeny trial it was  $4.6 \pm 0.02$  and  $3.4 \pm 0.04$  in Zvirgzde and Kalsnava, respectively. In both experiments with more than one site significantly ( $p < 0.001$ ) lower degree of needle cast damage was observed in experiments in eastern Latvia – Kalsnava, where the average daily air temperature in August was lower than in other sites. There was a similar trend between years found in the experiment of Daugmale: warmer weather and/or higher amount of precipitation in previous autumn resulted in increased severity of damages in the next year. Therefore increasing needle cast damages due to predicted rise of temperature can be foreseen in future. The correlation between the degree of needle cast damage and growth traits was negative and statistically significant both at provenance and family mean level. Therefore selection of less affected families and provenances for forest regeneration material is suggested. Study was carried out in Latvian Council of Sciences project "Adaptive capacity of forest trees and possibilities to improve it" (No 454/2012)

**Key words:** resistance, forest tree breeding, adaptation, genotype x environment interaction.