Abstract

Isoprenoids are important components of conifer resin and represent an important part of constituted defence system against herbivores and pathogens. Drought is one of the most important factors that influences the tree physiology and resitance. Due to decreased turgor of resin canal cells, the water insufficiency affects the pressure of the resin and thereby the ability of trees to physically prevent pathogen or herbivore invasion by effective outpouring of the resin. In addition, drought can also change the resin composition and thus can influence the quality of volatiles emitted by the tree.

The Norway spruce, *Picea abies*, is the predominant species of production forests in moderate climate zone. Bark beetles, *Ips typographus*, represent the most important pest species of spruce. In general, pioneer bark beetles use host volatiles to orient themselves toward the tree suitable for colonization and in many species host volatiles synergize bark beetle aggregation pheromones. Thus the host volatile composition could affect significantly host colonization.

This diploma thesis studied the influence of drought on the production and composition of isoprenoid volatile organic compounds in 80 – 100 years old spruce trees. Using *I. typographus* antennae as biological detectors, we also studied which resin substances are perceived by *I. typographus* beetles and thus have the potential to influence their behavior during orientation toward the host tree. Analysis of volatile components was performed using two-dimensional gas chromatography with mass spectroscopy (GC×GC-TOFMS). The analytical data were compared with conventional statistical methods and multifactorial analysis. Biological activity of volatile resin was determined by gas chromatography combined with electroantennographic detection (GC-FID-EAD). We identified 18 monoterpenes and 19 sesquiterpenes. The qualitative and quantitative parameters of analyzed samples from stressed trees and controls were similar. Analyses of GC-FID-EAD revealed that from all of the volatile substances identified in the resin, only 11 were antenally active. These compounds possess the potential to influence the orientation of *I. typographus* bark beetles to non-stressed trees.

Key words: *Ips typographus*, *Picea abies*, terpenes, GC×GC-TOFMS, GC-EAD, water stress