

**SHORT COMMUNICATION**

## Role of monoterpenes in *Hylobius abietis* damage levels between cuttings and seedlings of *Picea sitchensis*

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**Abstract**

This study investigated the role of monoterpenes, a group of chemicals known to be involved in plant defence, in the susceptibility of Sitka spruce [*Picea sitchensis* (Bong.) Carr.] plants derived from both cuttings and seedlings to attack by the large pine weevil *Hylobius abietis* (L.). Results showed that, given the choice, weevils prefer to feed on the shoots of seedlings than of cuttings and that this preference continued over a period of 6 days, although the overall level of feeding declined. This observation was associated with a higher level of monoterpenes in the shoots from cuttings than in those from seedlings. When the weevils were restricted to the stems and given no choice, levels of damage to the bark were similar in both plant types.

Keywords: *Cuttings*, *Hylobius abietis*, *large pine weevil*, *Picea sitchensis*, *seedlings*, *Sitka spruce*.

**Introduction**

The large pine weevil *Hylobius abietis* L. (Coleoptera: Curculionidae) is an endemic species to Europe and northern Asia, and is a serious pest on recently clear-felled forest sites. *Hylobius abietis* feeds on young trees damaging the phloem and bark and, where feeding is severe, gnawed patches can coalesce (stem girdling), resulting in tree death (Scott & King, 1974). In the past, control measures largely depended on the application of prophylactic insecticides; however, their use has been restricted as a result of concerns over health. Although alternative methods of limiting damage are currently being considered, none is yet seen as a cost-effective solution.

Recent evidence suggests that plants derived from cuttings are more resistant to damage by *H. abietis* than plants derived from seedlings (e.g. Hannerz et al., 2002), but a clear explanation of the mechanism behind these observations has not been presented. One theory is that resistance to attack may be associated with the natural defence mechanism of plants. One of the main mechanisms of plant defence against insect attack is the production of oleoresin, a

complex mixture of monoterpenes, sesquiterpenes and diterpene resin acids (Phillips & Croteau, 1999). These compounds are sequestered in preformed resin ducts, repelling insects either by intoxication or by forming a physical barrier. Upon wounding, trees also produce traumatic resin ducts and increase monoterpene synthesis (Tomlin et al., 2000; Buyn-McKay et al., 2006). It has been reported that Sitka spruce trees resistant to the white pine weevil (*Pissodes strobi*) show a different monoterpene pattern in the cortical resin (Harris et al., 1983). Subsequent investigations by Tomlin et al. (1997) did not find significant differences in the

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