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**Vole damage to planted tree regeneration conditioned by some environmental factors.**

**Schäden verursacht durch Wühlmäuse auf aufgeforsteten Kahlschlägen**

Josef Suchomel<sup>1</sup>, Luboš Purchart<sup>1</sup>, Marta Heroldová<sup>2</sup>, Miloslav Homolka<sup>2</sup>, Jiří Kamler<sup>2</sup>, Emil Tkadlec<sup>2</sup>

**Schlagwörter:** Verjüngung, Standortfaktoren, Wühlmauseinfluss

**Key words:** forest regeneration, site parameters, vole impact

**Kurzfassung**

In den letzten Jahren wurde in der Tschechischen Republik der Ersatz von Nadelholzmonokulturen durch Mischbestände von Laub- und Nadelholz in „naturähnlicher“ Zusammensetzung mit bedeutendem Aufwand vorangetrieben. Diese Aufforstungsaktivitäten wurden durch den Einfluss von Wühlmäusen (v. a. der Arten *Microtus arvalis*, *M. agrestis* und *Myodes glareolus*) bzw. durch die von ihnen verursachten Schäden an der Baumrinde erschwert. Zur Quantifizierung dieser Wühlmausschäden wurden Untersuchungen auf 4 Waldstandorten, an 7200 Bäumen im Alter von 3 bis 15 Jahren durchgeführt (wobei Buche die vorherrschende Baumart der Bestände ist). Als Hauptfaktoren für das Auftreten von Schäden wurden die Dichte und Höhe der Krautschicht auf den Kahlschlägen sowie der Anteil von Gräsern und Gräserstreu in der Krautschicht auf den Flächen festgestellt.

1. Department of Forest Ecology, Mendel University in Brno, Zemědělská 3, 61300 Brno, Czech Republic, suchomel@mendelu.cz, + 420545134183, lubos.purchart@mendelu.cz

2. Institute of Vertebrate Biology, AS CR, Květná 8, 60365 Brno, Czech Republic, heroldova@ivb.cz, homolka@ivb.cz, kamler@ivb.cz, emil.tkadlec@upol.cz

## Abstract

Recently, a great effort has been applied in the Czech Republic to replace forest monocultures of coniferous species by mixed coniferous-broad-leaved stands in a 'close to nature' composition. These reforestation activities are complicated by impact of vole species (above all *Microtus arvalis*, *M. agrestis* and *Myodes glareolus*) through damage to tree bark. To quantify the damage by voles, we conducted research in 4 forest areas on 7200 trees from 3 to 15 years of age (beech being the dominant tree species). The main pre-requisite factors responsible for damage were the cover and the height of weedy species in the clearings and the proportion of grasses and grass litter on the plots.

## Introduction

Rodents represent an important natural component of forest ecosystems. In food chains, they function as consumers of the primary and secondary production. Thus, they often contrast with interests of forest regeneration and silviculture. A typical feature of rodents is a high reproduction rate and related fluctuations in their abundance over seasons of the year and over several-year periods (Tkadlec & Zejda 1998; Stenseth 1999). Cyclical changes in the size of rodent populations are affected by external factors such as weather, predators, diseases and vegetation structure, as well as by intra- and interspecies relations (competition for food resources, social behaviour and stress) (Hansson & Henttonen 1985; Hansson 1992; Gill 1992; Pucek et al. 1993). This high reproductive rate is, from the forestry point of view, the most significant problem as at high population densities at localities with favourable conditions (open areas) they cause damage to vegetation especially on planted regeneration of forest stands (Schneider 1996). The biggest problems are caused by species that consume mainly the vegetative parts of plants; i.e. the field vole (*Microtus agrestis*) and the common vole (*Microtus arvalis*). Bank vole (*Myodes glareolus*) is a forest rodent with a broader feeding niche and thus is less damaging in forest plantations (Borowski 2007; Hansson 2002). At times of food shortage, these species feed on bark and under certain conditions they are able to destroy young trees in entire planted areas (Sullivan et al. 1993; Niemeyer & Haase 2002; Huitu et al. 2009). Factors influencing the reproduction of rodents in forest environments, and thus also the level of damage to trees, have not yet been sufficiently explained (Niemeyer & Haase 2003). The extent of damage is probably mostly influenced by the abundance of rodents at the specific locality in the winter season, the attractiveness of the planted tree species compared to other accessible food sources and the depth and duration of