Voles and boreal silviculture – overview of damage and options for management

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Voles of the genera *Microtus* and *Myodes* have become increasingly severe pests in Finnish silviculture during recent decades. During this time, the level of damage caused by voles has clearly surpassed that caused by ungulates, the previously most notorious of vertebrate forestry pests. It was estimated that during the most recent population density peak in the winter of 2008/09 voles destroyed ca. 36 million tree seedlings in the southern half of Finland. The collective area of total damage encompassed 20,000 hectares, and that of minor damage, such as eating the apical buds of conifer seedlings, roughly three times more. Financial losses due to replanting were estimated to near 20 million euros. The degree of damage caused by voles is first and foremost influenced by vole density. In Finland, vole populations fluctuate cyclically in three-year periods, albeit not synchronously over the whole country. Damage to seedlings occurs almost exclusively during winters immediately succeeding peak vole densities. The functional explanation for this appears to be that high density vole populations deplete their preferred winter food resources, grasses and herbs, and thereafter resort to consuming tree seedlings despite their poorer dietary quality. Silvicultural practices also affect the relative susceptibility of seedling stands to vole damage. For example, different tree species are differentially preferred by voles, small seedlings are more prone to damage than larger seedlings, and heavily fertilized seedlings are of higher nutritive value to voles, thus predisposing them to consumption. Intensive mechanical practices such as soil preparation, removal of slash and ground vegetation control all tend to reduce the quality of seedlings stands as habitat for voles, thus reducing the likelihood of population densities reaching destructive levels. Despite the severity of damage caused by voles, few management actions are currently widely employed by forest owners. The currently most often recommended modes of management are 1) timing of planting to years when a vole population peak is not imminent, 2) adequate soil preparation prior to planting, 3) mechanical or chemical control of grasses in seedling stands, 4) protection of seedlings by shelters and/or repellents, and 5) reduction of vole numbers in late autumn by trapping or poisoning. The Finnish Forest Research Institute is carrying out extensive laboratory and field experimentation on the applicability of each of these management actions, as well as on a suite of other topics with potential to contribute to the reduction of vole-induced damage in boreal managed forests.

Keywords: population cycle, seedling, silviculture, vegetation control, vole damage