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## ORIGINAL ARTICLE

## Short-term effects of mechanical and biological treatments on *Sorbus aucuparia* L. sprouting in mesic forests in Finland

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### Abstract

In reforestation areas in Finland, rowan (*Sorbus aucuparia* L.) can form dense thickets restricting the growth of commercially more valuable conifers. In this study we compared three different management methods to control excessive growth of rowan. These methods were traditional (mechanical cutting 10–15 cm above ground level), 1 m cut height treatment (saplings were cut 1 m above ground level), and biological control (as traditional method, but freshly cut stumps were squirted with mycelium of a fungus, *Chondrostereum purpureum* [Pers. ex Fr.] Pouzar). The short-term results one year after the treatments revealed that biological control was the best way to restrict rowan sprouting as the proportion of dead stumps was highest. Furthermore, the number and height of stump sprouts were even two times lower in the biological control than in the mechanical treatments. Although the biological control had the highest number of root suckers, the total number of stump sprouts and root suckers together was indicatively lower than in the other methods ( $p < 0.10$ ). Based on our results *C. purpureum* treatment seems promising. Yet, more efficient fungus strains and better methods to spread the fungus on stumps are needed before this method is applicable at commercial scale.

**Keywords:** *Chondrostereum purpureum*, reforestation areas, saplings, sprout control.

### Introduction

In newly planted spruce reforestation areas in Finland, rowan (*Sorbus aucuparia* L.) is one of the most invasive broadleaved tree species constituting on average 19% of the stock (Finnish Forest Research Institute, 1995). Brush control using mechanical cutting 10–15 cm above ground level is commonly applied to ensure the survival and growth of planted and directly seeded conifers. Yet, quick regrowth of broadleaved trees often makes this method quite inefficient. Chemical treatment would be more efficient (see e.g. Pitt et al., 1999) but its usage is currently restricted because of harmful environmental impacts and public opposition (Valkonen, 2005). Therefore new methods would be urgently needed. In this study, we compared the efficacy of three different management methods on rowan saplings.

Rowan is a widespread and very common short-lived pioneer tree species in Europe existing especially in spruce (*Picea abies* (L.) H. Karst.) and pine (*Pinus sylvestris* L.) forests (Raspé et al., 2000; Zerbe,

2001). It usually forms only a small part of the tree stand as an undergrowth (Żywiec & Ledwoń, 2008). In Central Europe it has an important role in reforestation and restoration of polluted spruce forests (Lettl & Hýsek, 1994; Moravčík, 1994). In Scandinavia, rowan can be abundant under closed boreal forest stands (Hamberg et al., 2009; Hofgaard, 1993; Lehvävirta & Rita, 2002; Żywiec & Ledwoń, 2008). In old-growth spruce forests rowan seeds are originally spread by birds (Zerbe, 2001; Żywiec & Ledwoń, 2008). Despite poor light conditions, rowan can germinate and form visible and belowground stems under closed canopies. When mature trees are removed, rowan reproduces mainly through vegetative growth and as fast-growing species it may gain an advantage in relation to other species (see Moravčík, 1994; Zerbe, 2001).

Rowan has good ability to produce stump sprouts and root suckers (Zerbe, 2001). After cutting, the regrowth of rowan is quick and a disturbance like that can even increase shoot growth (Hester et al., 2004). Rowan has considerable nutrient reserves in