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From Forest Nursery Notes, Summer 2013

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Field performance of Scots pine (*Pinus sylvestris* L.) seedlings planted in disc trenched or mounded sites over an extended planting season

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Received: 26 May 2011 / Accepted: 19 January 2012 / Published online: 28 January 2012
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Abstract Economic pressures have driven an ever-widening period during which foresters use machines to plant Scots pine (*Pinus sylvestris* L.) seedlings. In Fennoscandia, this period has recently stretched to the entire growing season. To evaluate the performance of seedlings planted during this extended period, three experiments were carried out in Central and Northern Finland over 2 years. One-year-old and current-year seedlings were planted in mounds or disc-trenched furrows when soil temperatures were $>0^{\circ}\text{C}$. When 1-year-old seedlings grown for spring planting and overwintered outdoors were planted after mid-June, more needles browned and growth was reduced, possibly because seedlings were oversized with respect to planting density and the volume of growth media. When current-year seedlings sown in spring were planted from July to November, those planted in late September and October grew less in later years than those planted earlier, but survival was unaffected. No large differences in field performance were found with respect to whether seedlings were planted in mounds or disc-trenched furrows. In conclusion, Scots pine seedlings can be machine planted in mounds or furrows during May and early June (later in the North) and then continued from early August until late September, provided climatic conditions in late spring and early autumn are typical and similar to those experienced in Central Finland.

Keywords *Pinus sylvestris* · Planting · Nordic forestry · Planting date · Seedling material · Soil preparation

Introduction

The use of planting machines is increasing in Nordic forestry (Rantala et al. 2009). In order to ensure that these expensive machines operate cost-effectively, the planting period should be as long as possible. In addition, a dwindling labour force of forest workers necessitates that the planting period be extended from its current limits (late May to early June and late

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