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From Forest Nursery Notes, Winter 2008

© 151. Growing *Picea abies* container seedlings in peat and composted forest-nursery waste mixtures for forest regeneration. Veijalainen, A.-M., Juntunen, M.-L., Heiskanen, J., and Lilja, A. Scandinavian Journal of Forest Research 22:390-397. 2007.

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Scandinavian Journal of Forest Research
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713711862

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Online Publication Date: 01 January 2007
To cite this Article: Veijalainen, Anna-Maria, Juntunen, Marja-Liisa, Heiskanen, Juha and Lilja, Arja (2007) 'Growing **Picea abies** container seedlings in peat and composted forest-nursery waste mixtures for forest regeneration', Scandinavian Journal of Forest Research, 22:5, 390 - 397
To link to this article: DOI: 10.1080/02827580701647271
URL: http://dx.doi.org/10.1080/02827580701647271

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Scandinavian Journal of Forest Research, 2007; 22: 390–397

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ORIGINAL ARTICLE

Growing Picea abies container seedlings in peat and composted forest-nursery waste mixtures for forest regeneration

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Abstract
The suitability of using composted forest-nursery waste as a component in growing medium was studied. Norway spruce [Picea abies (L.) Karst.] seedlings were grown in containers filled with sphagnum peat (100P), forest-nursery waste compost (100C) and in peat mixtures containing 25 or 50% compost by volume (75P25C and 50P50C, respectively). Morphological and chemical characteristics of the seedlings and the water and nutrient contents of the growing media were studied during 22 weeks of nursery cultivation. The seedlings were outplanted the following spring, and the survival and growth were followed for 3 years. Compost additions decreased seedling height, diameter and shoot dry mass, but root dry mass was the same in 100P and 75P25C after nursery cultivation. Foliar nutrient concentrations were optimal in all the seedlings, although foliar nitrogen content was lower the greater the proportion of compost in the medium. Compost additions did not affect the root-egress potential tested before outplanting. The 100P seedlings grew significantly more than the other seedlings during the first summer at the forest site. Thereafter, compost additions did not affect growth, but the final height and diameter were still the lowest in 100C. The results suggest that forest-nursery waste compost has potential to be used as a component of peat-based growing medium. However, specially adjusted nursery-cultivation practices need to be used for compost-containing media.

Keywords: Biowaste, conifers, growing medium, outplanting, recycling.

Introduction

Low-humified sphagnum peat is used extensively as a growing medium for the production of container seedlings in the Nordic countries, and also globally in other plant-production systems (Bunt, 1988; Juntunen & Rikala, 2001). The research and use of other alternative growing-medium materials and soil amendments have greatly increased during recent decades (Bunt, 1988; Carlile, 2005; Davis et al., 2006), because of the need to cut costs associated with the use of growing media and also partly because of the increasing concern about overextraction of peat. The beneficial effect of compost utilization on plant growth has been reported in many greenhouse- and nursery-crop production systems (e.g. Holopainen et al., 2002; Wilson et al., 2002; Davis et al., 2006). However, the studies also show that the plant response to compost addition depends on the plant species (Wilson et al., 2002), the inherent properties of the compost and the functionality of the composting method (Raviv, 2005).

Owing to the prevailing environmental, political and economical goals, there is considerable pressure to minimize the generation and landfilling of waste materials and to decrease energy consumption. The EU Landfill Directive 1999/31/EC supports the composting of biodegradable waste for utilization in agricultural or ecological applications. The biodegradable waste formed in forest nurseries consists of rejected tree seedlings, which do not meet the size and shape requirements, or are affected by plant diseases or pests, as well as the growing media, weeds, grass clippings and fallen leaves. Windrow

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(Received 10 April 2007; accepted 24 August 2007)

ISSN 0282-7581 print/ISSN 1651-1891 online © 2007 Taylor & Francis
DOI: 10.1080/02827580701647271