From Forest Nursery Notes, Winter 2008

© 9. Effects of early long-night treatment on diameter and height growth, second flush and frost tolerance in two-year-old *Picea abies* container seedlings. Kohmann, K. and Johnsen, O. Scandinavian Journal of Forest Research 22:375-383. 2007.

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

Effects of early long-night treatment on diameter and height growth, second flush and frost tolerance in two-year-old **Picea abies** container seedlings

Ketil Kohmann [a] øystein Johnsen
[a] Norwegian Forest and Landscape Institute, Ås, Norway

Online Publication Date: 01 January 2007
To cite this Article: Kohmann, Ketil and Johnsen, øystein (2007) 'Effects of early long-night treatment on diameter and height growth, second flush and frost tolerance in two-year-old **Picea abies** container seedlings', Scandinavian Journal of Forest Research, 22:5, 375 - 383
To link to this article: DOI: 10.1080/02827580701520486
URL: http://dx.doi.org/10.1080/02827580701520486

Scandinavian Journal of Forest Research, 2007; 22: 375–383

Taylor & Francis
Taylor & Francis Group

ORIGINAL ARTICLE

Effects of early long-night treatment on diameter and height growth, second flush and frost tolerance in two-year-old Picea abies container seedlings

KETIL KOHMANN & ØYSTEIN JOHNSEN

Norwegian Forest and Landscape Institute, Ås, Norway

Abstract
The object of this study was to obtain Norway spruce seedlings with buds set, ready for summer planting from 1 July. An early long-night treatment prevented flushing of the newly formed terminal buds and ceased height growth, but slightly reduced hardiness in buds and needles. Nevertheless, a sufficient hardiness level in the autumn was acquired at a Norwegian nursery at 59'46'N, with plants of the local provenance given a long-night treatment (14 h) for 13 days from 25 June. Similar treatment at a nursery at 64'30'N did not give the same result; all treatments led to a second flush with resumed growth of the local provenance. A trial with seed lots from several provenances was therefore performed at this nursery, and a significant correlation was found between the critical night length of the seed lot and their ability to produce non-flushing buds; the longer the critical night length of the seed lot, the fewer non-flushing buds. Responses at the northern nursery are probably due to the lack of a dark period after termination of the treatment, and too short a treatment period to attain bud dormancy. An early and successful long-night treatment will also produce shorter seedlings with a larger root collar diameter.

Keywords: Autumn shoots, critical night length, Picea abies, root collar growth, seedling production.

Introduction

Traditionally, Norway spruce seedlings have been planted in Norway during the months of May and June. In the autumn the planting resumes from the first half of September and continues until the soil becomes frozen or snow covered. For the early autumn planting the seedlings are usually hardened by a long-night treatment for 2 weeks, starting in the last week of July. There is a demand for an extended planting season from forest contractors operating planting machines. Such an extension would also benefit the increasing use of imported labour from abroad for manual planting. The month of July with both warmth and moisture could have been the best planting season (Mork, 1951), if the seedlings were not in their most vulnerable growing phase. There is also a demand for sturdier seedlings with a larger root collar diameter in relation to seedling height. This will reduce the squeezing by weeds in the autumn, which often occurs in combination with snowfall. Young seedlings (Holmgren, 1867; Sylvén, 1927; Lekander & Söderström, 1969) or seedlings with a small root collar diameter are less affected by bark-feeding weevils (e.g. Hylobius sp.) (Lindström & Hellqvist, 2003), and the intensity of gnawing increases as the root collar diameter exceeds a certain threshold. The mortality is, however, less for the larger seedlings (Lekander & Söderström, 1969; Kohmann, 1999). In a Swedish experiment (Thorsén et al., 2001), resistance against feeding increased up to a diameter of 8 mm, with improved survival at 6 mm diameter.

In Norway spruce, budset can be achieved with long-night treatment (Dormling et al., 1968), and radical long-night treatment has been a routine procedure since the introduction of the containerized seedling in Norwegian nurseries in the early 1970s. Plants are given long-night treatment (12-15 h) for a period of 2 weeks at the turn of

Correspondence: K. Kohmann, Norwegian Forest and Landscape Institute, Høgskoleveien 8, NO-1432 Ås, Norway. E-mail: ketil.kohmann@skogoglandskap.no

(Received 7 January 2007; accepted 9 June 2007)

ISSN 0282-7581 print/ISSN 1651-1891 online
DOI: 10.1080/02827580701520486