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ORIGINAL PAPER

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# Effect of seed coverings and seed pretreatments on the germination response of *Alnus glutinosa* and *Betula pubescens* seeds

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**Abstract** The germination of common alder (*Alnus glutinosa* (L.) Gaertn.) and downey birch (*Betula pubescens* Ehrh.) seeds is often poor in bare-root nurseries. The effect of a variety of seed coverings and a few seed pretreatments on seedling emergence was examined in this study in an attempt to address this problem. Seeds of each species were sown in trays containing nursery soil, covered with grit, gravel, sand, combinations of these coverings, a hydromulch or a sealed plastic cloche and then incubated for 6 weeks at 17–20°C. The grit combined with sand or gravel, the hydromulch and the cloche increased seedling emergence when compared with the standard grit. In another experiment, seeds of each species were fully imbibed (FI) (> 50% moisture content, MC), as per standard practice, or adjusted to target MC (TMC) (30–35% MC) levels, and then chilled to release dormancy. Some seeds of each MC treatment were primed at 20°C for 2 days following chilling, after which all seeds were evaluated in laboratory tests and a nursery trial. Germination potential of the FI seeds declined in the lab tests by the second test date, which was reflected in low seedling emergence in the nursery in birch. The primed FI seeds of alder germinated most rapidly in the nursery, but other effects were not significant. Seedling emergence was better in the nursery in response to the TMC than the FI pretreatment in birch.

**Keywords** *Alnus glutinosa* · *Betula pubescens* · Seedling production · Seed covering · Seed pretreatment · Seed germination

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## Introduction

Common alder (*Alnus glutinosa* (L.) Gaertn.) and downey birch (*Betula pubescens* Ehrh.) seeds[1] often germinate poorly in bare-root nurseries in Ireland, but the exact reason for this is not known. For this reason, a research project was initiated in Ireland in 2001 with the objective of improving germination and seedling emergence in these species. In the first phase of the project, new seed pretreatments were developed using laboratory tests, while in the second phase attempts were made to address post-sowing problems and to evaluate the best seed pretreatments (developed during first phase) in the nursery. Some results from the second phase of project are reported in this paper. There is little published information to this end for both species.

In bare-root nurseries, seeds are covered just after sowing with a variety of materials to help improve the post-sowing environmental conditions for germination, especially moisture availability (Hegarty 1979; Pratt 1986; Lafond and Fowler 1989; Barnett and McGilvray 2000; Barnett 2002). It is difficult to completely protect seeds from desiccating using irrigation water alone (Mason 1994). Grit, sand, perlite or vermiculite are frequently used to cover seeds (Wurr et al. 1985; Finch-Savage et al. 1991; Kajimoto 2002), but mulches and cloches can also be used (Mason 1994). Cloches and mulches are usually erected/laid down just after sowing. A mulch is spread on top of the soil (e.g. sawdust, polythene) or incorporated into the soil as (e.g. a hydromulch). Mulches and cloches may also help to minimise potential damage to newly emerging plants from frost and wind (South 1976; Guariglia and Thompson 1984; Mason 1994). A cloche is a protective layer of polythene raised off the bed (usually using wire hoops), which increase temperature and humidity levels inside the cloche (Mason 1994). The effect of a range of seed

[1]The term 'seed' is used to describe a propagating organ, consisting of a protective structure enclosing an embryo.