

We are unable to supply this entire article because the publisher requires payment of a copyright fee. You may be able to obtain a copy from your local library, or from various commercial document delivery services.

From Forest Nursery Notes, Summer 2011

134. © Propagation and seedling cultivation of the endemic species *Nothofagus alessandrii* Espinosa in central Chile. Santelices, R., Navarro-Cerrillo, R. M., and Drake, F. *Restoration Ecology* 19(2):177-185. 2011.

RESEARCH ARTICLE

Propagation and Seedling Cultivation of the Endemic Species *Nothofagus alessandrii* Espinosa in Central Chile

Rómulo Santelices,^{1,2} Rafael M. Navarro-Cerrillo,³ and Fernando Drake⁴

Abstract

Nothofagus alessandrii is an endemic and endangered species from the Maule Region of Central Chile. The forests it once dominated have been severely degraded and fragmented by human activities, and it is estimated that only 350 ha remain. Yet, available information for propagation and nursery plant cultivation of this species is conspicuously lacking. Future efforts to restore this ecosystem type will rely, in large part, on advancing the capacity to propagate and cultivate this highly threatened species. To this end, we studied the response (germination process and nursery growth) of viable seeds of *N. alessandrii* to different pre-germination treatments, sowing times, and slow-release fertilizer. The highest germination percentages were obtained with cold stratification for periods

of 30 and 45 days (84.9 and 82.6%, respectively). Sowing time was also relevant, with seeds obtaining highest germination rates (53%) when sowing during spring season (September) as well as the best growth rates. Both cold stratification and GA₃ treatments can provide adequate germination percentage and similar seedling quality. After one nursery season, no clear effect of slow-release fertilizer on plant growth was observed. The results of this study provide important baseline information for propagation and nursery techniques for restoration programs of *N. alessandrii*.

Key words: gibberellic acid (GA₃), ruil, seeds, slow-release fertilizer, sowing time, stratification.

Introduction

The mesomorphic region of Chile has been subjected to constant anthropogenic pressure during the last two centuries, resulting in a serious decline in the forests of this region Donoso & Lara 1995. One of the most dramatic examples is that of *Nothofagus alessandrii* Espinosa (Nothofagaceae) ("ruil"), an endemic species of the central region of Chile, which is a species listed in danger of extinction (Benoit 1989). The natural distribution of this species is restricted to shady slopes of the Cordillera de la Costa in the Maule Region of Central Chile (San Martín et al. 1991, 2006). The current range of this species has been drastically reduced to some 350 ha, which are distributed across a highly fragmented landscape (Bustamante & Grez 1995; Bustamante & Castor 1998). Remnant forests of *N. alessandrii* are

dispersed within a matrix of *Pinus radiata* D. Don, an exotic species frequently used in forest plantations (Bustamante & Simonetti 2005), which is capable of successfully invading *N. alessandrii* forests (Bustamante & Castor 1998; Bustamante & Simonetti 2005). *N. alessandrii* is not only considered to be Chile's most threatened tree (Hechenleitner et al. 2005), but, in addition, it has also been estimated that the relative deforestation rate of these forests is one of the highest worldwide (Bustamante & Castor 1998). An urgent study and management of the remaining native vegetation is required in the area in which this species is naturally distributed, an area where 25 conservation biodiversity hotspots have been declared (Myers et al. 2000). In this context, restoration of this highly degraded ecosystem is a priority task. For that reason, it is highly important to determine, among other factors, successful mechanisms of propagation and cultivation of these unique plants in nursery settings to provide materials for restoration projects.

Most of the species of the genus *Nothofagus* possess an endogenous dormancy (Wilcox & Ledgard 1983; León-Lobos & Ellis 2005), although not all of them with the same level (Wardle & Cambell 1976). The treatments most commonly employed to overcome this type of dormancy are cold stratification and soaking seeds in gibberellins, especially in gibberellic acid (GA₃) (Hartmann & Kester 1998; Barceló-Coll et al. 2001). It has been observed that subjecting

¹ Faculty of Agrarian and Forestry Sciences, Department of Forestry Science and Dryland Technology Centre, Maule Catholic University, Casilla 617, Talca, Chile

² Address correspondence to R. Santelices, email rsanteli@ucm.cl

³ Faculty of Agronomy and Forestry, Department of Forest Engineering, Córdoba University, Avenida Menéndez Pidal s/n, 14080 Córdoba, España

⁴ Faculty of Forestry Sciences, Department of Forest Management and Environment, Concepción University, Casilla 160-C, Correo 3, Concepción, Chile