

# QUALIBROAD

## Improving the uniformity and quality of broadleaf planting stock

### PROJECT TEAM

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### BACKGROUND

The planting of broadleaf species in Ireland has increased in recent years, with broadleaves now accounting for more than 30% of the current planting programme. Consequently, there has been a renewed focus on improving the yield and quality of broadleaf planting stock in the nursery. The main focus of the QUALIBROAD project was to address these issues for broadleaf species of importance in the forestry programme in Ireland. The development of new seed pretreatments and seed

storage protocols, and the effects of post germination aspects (cloches, fertilization, mini-plugs) of nursery culture on seedling growth, yield and quality were examined over several years. The seed research element of the project conducted in previous years at the laboratory in University College Dublin focussed on common alder (*Alnus glutinosa* Gaertn.), birch (*Betula pendula* Roth. and *Betula pubescens* Ehrh.), ash (*Fraxinus excelsior* L.) and pedunculate oak (*Quercus robur* L.). Most of this research was completed in 2007. In 2008, research on ash seeds was continued and new research commenced on the seeds of spindle tree (*Euonymus europaeus* L.), rowan (*Sorbus aucuparia* L.) and Guelder rose (*Viburnum opulus* L.).

### OBJECTIVES

- To improve seed germination in ash, spindle tree, rowan and Guelder rose;
- To evaluate the potential for transplanting alder plants as miniplugs;
- To grow oak seedlings to plantable size in a single season using the exponential fertilization method.

### PROGRESS

Seed research on spindle tree, rowan and Guelder rose commenced in 2008. Since the seeds of these species require very lengthy pretreatment periods (including a warm phase) to break dormancy, only preliminary work could be completed in 2008. In addition, problems were encountered in conducting seed tests on spindle tree seeds, which delayed progress further. The work in ash focussed on (i) germination temperature responses of pretreated (non-dormant) seeds, and (ii) the impact on the post-storage germination of pretreated seeds.

New research in the area of mini-plug transplanting was completed, in collaboration with Prof. Anders Mattsson of Dalarna University. The mini-plug seedlings were grown in Sweden (using seed supplied by Coillte) and then transplanted into the nursery in early April and early May. The seedlings planted in May performed very well, but those planted in April performed poorly due to the unseasonably cold and windy weather that prevailed soon after planting. Despite these problems, the results were very promising, indicating that alder seedlings could be produced in a single growing season using the mini-plug system (Figure 1).



Figure 1: Seedlings of alder that were transplanted as mini-plugs (ca 5 weeks old) into plots at Ballintemple nursery in 2008: (a) just after planting, (b) at the end of growing season, (c) typical root system at end of growing season.

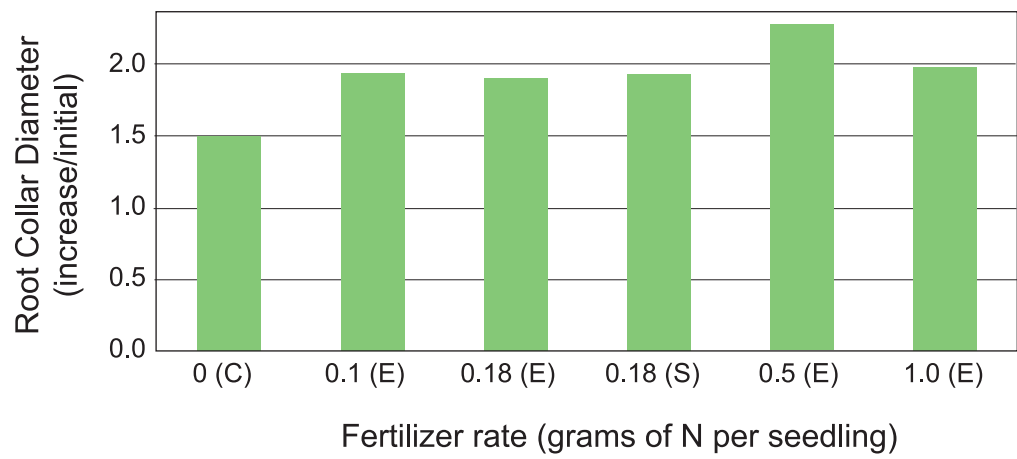


Figure 2: Diameter growth relative to initial diameter in oak seedlings in response to fertilizer treatments. Treatments: C = no fertilizer; S = standard level (as currently used operationally); E = exponential fertilization.

In another study in collaboration with Prof. Douglass Jacobs of Purdue University, the use of exponential nutrient loading to improve the quality of pedunculate oak seedlings and leaching dynamics in a trial laid down at Ballintemple nursery was investigated. The preliminary results from this study are promising (Figure 2), although all the sampling and data analysis has not been completed yet. In particular, there was evidence that the exponential method reduced nutrient leaching, with consequent environmental benefits.

**ACTIVITIES PLANNED**

Continue the seed research element and fertilization study in oak (in collaboration with Purdue University).

**OUTPUTS**

Doody, C. and O'Reilly, C. 2008. Drying and soaking pretreatments affect germination in pedunculate oak. *Annals Forest Science* 65: 509 p1-7.

Doody, C. and O'Reilly, C. 2008. *Long periods of warm pretreatment improve germination in ash seeds*. Poster presented at the 9th ISSS Conference on Seed Biology, 6-11 July 2008, Olsztyn, Poland.

O'Reilly, C. *The New Forests of Ireland*. Invited seminar presentation. Purdue University, Indiana, 22 April 2008.

O'Reilly, C. and Cabral, R., 2008. *Lifting and handling stresses can cause shoot dieback in oak*. COFORD, Dublin.

Schmal, J., Jacobs, D.F. and O'Reilly, C. 2008. *Exponential fertilization of pedunculate oak (Quercus robur L.) seedlings: quality assessment, nutrient budgeting, and leaching dynamics*. Poster presented at the Society of America Foresters Convention, 5-9 November 2008, Reno, NV, USA.