From Forest Nursery Notes, Summer 2009

42. © Techniques for restoring fen vegetation on cut-away peatlands in North America. Graf, M. D. and Rochefort, L. Applied Vegetation Science 11:521-528. 2008.

Applied Vegetation Science 11: 521-528, 2008
doi: 10.3170/2008-7-18565, published online 26 June 2008

Techniques for restoring fen vegetation on cut-away peatlands in North America

Graf, M.D.[1,2*] **& Rochefort, L.**[1,3]

[1]*Peatland Ecology Research Group and Centre d'études nordiques, Département de phytologie, Université Laval, Québec, G1K 7P4, Canada;*
[2]*Current address: Karl-Grüneklee-Str. 1, 37077 Göttingen, Germany;* [3]*E-mail line.rochefort@plg.ulaval.ca;*
[*]*Corresponding author; E-mail martha-darling.graf.1@ulaval.ca*

Abstract

Question: Which restoration measures (reintroduction techniques, reintroduction timing and fertilization) best enable the establishment of fen species on North American cut-away peatlands?

Location: Rivière-du-Loup peatland, southern Québec, Canada.

Methods: In total, eight treatments which tested a combination of two reintroduction techniques, two reintroduction timings and the use of phosphorus fertilization were tested in a field experiment within a completely randomized block design.

Results: *Sphagnum* transfer, a reintroduction technique commonly used for bog restoration in North America, was effective for establishing *Sphagnum* and *Carex* species. The hay transfer method, commonly used for fen restoration in Europe, was much less successful, probably due to questionable viability of reintroduced seeds. The treatments which included light phosphorus fertilization, had a higher *Carex* cover after three growing seasons. The timing of the reintroductions had no impact on the success of vegetation establishment. However, vegetation reintroduction should be carried out in the spring while the ground is still frozen to minimize other ecological impacts.

Conclusions: The success of the diaspore reintroduction technique on small-scale units indicates that a large-scale restoration of fens using this technique is feasible.

Keywords: *Carex*; Fertilization; Reintroduction timing; Revegetation; *Sphagnum*.

Nomenclature: Scoggan (1978) for vascular plants; Anderson (1990) for *Sphagnum*; Anderson et al. (1990) for other mosses.

Abbreviations: GLM = Generalized linear modeling.

Introduction

Research on restoring bog vegetation in North America is abundant (Price et al. 1998; Rochefort 2000; Rochefort et al. 2003; Campeau et al. 2004; Chirino et al. 2006). However, research on restoring fen vegetation has only recently begun (Cooper & MacDonald 2000; Cobbaert et al. 2004). These projects aim to restore fen vegetation on harvested peatlands. Modern harvesting techniques can lead to exposure of the underlying minerotrophic peat and mineral deposits. Such peatlands are richer in minerals and higher in pH than the pre-existing bog, thus creating conditions which are sub-optimal for bog community restoration. Restoration towards a fen including *Sphagnum* species common in moderate-rich fens is more desirable for such sites (Wind-Mulder et al. 1996).

Although much research has been conducted on fen restoration in Europe, little can be transferred to North America due to different goals, desired end-states and restoration challenges (Table 1). These dissimilarities can be attributed to differences in starting conditions, vegetation types and land-use, as well as population densities and the resulting pressure on the landscape. Due to the paucity of pristine fens in Europe, restored fens create important habitats (Kratz & Pfadenhauer 2001). Therefore, the goal of restoration projects in Europe is often high plant diversity and the successful reintroduction of rare species (Wheeler & Shaw 1995; van Duren et al.1998; Hald & Vinther 2000; Kratz & Pfadenhauer 2001; Tallowin & Smith 2001; Lamers et al. 2002). In contrast, large undisturbed fen systems are abundant in boreal North America (Zoltai & Pollet 1983; Rubec 1998; Vitt et al. 2005); therefore, the focus of restoration is on the return of the peatland's ecosystem functions (Rochefort 2000). The great majority of European projects aim to restore intensive agricultural lands to extensively managed fen meadows, not back to their undisturbed state (Rowell et al. 1985; Pfadenhauer 1994; Pfadenhauer & Klötzli 1996; Lamers et al. 2002; Jacquemart et al. 2003). The restoration of agricultural lands implies challenges (i.e. eutrophication, competition with existing plants, succession towards forest; succession towards bog due to altered hydrology) different from those in North America. Abandoned, cut-over peatlands are primary succession sites which are void of vegetation and have no viable seed bank (Campbell et al. 2003). Owing to these inherent differences, fen restoration techniques which correspond with the North American context should be developed and tested.