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REGULAR ARTICLE

Growth and nutrition of black spruce seedlings in response to disruption of *Pleurozium* and *Sphagnum* moss carpets in boreal forested peatlands

Benoit Lafleur · David Paré · Nicole J. Fenton · Yves Bergeron

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Abstract In boreal forested peatlands, we disturbed *Sphagnum* spp. and *Pleurozium schreberi* carpets to see how disturbance influenced substrate physico-chemistry, and growth and foliar nutrition of planted *Picea mariana* seedlings. Carpets were hand disturbed using gardening tools to a depth of approximately 25 cm. Carpet disturbance was aimed at disrupting only the organic layer and did not result in the mixing of organic matter with mineral soil. Disturbed carpets, whether *P. schreberi* or *Sphagnum* spp., were warmer than undisturbed carpets and had a lower cover of ericaceous shrubs. *Pleurozium schreberi* carpets had a higher decomposition index than *Sphagnum* spp. carpets, whereas disturbance had no effect on this variable. *Pleurozium schreberi* had higher N_{tot} and dissolved organic N concentrations (DON) than *Sphagnum* spp., whereas disturbance increased NH_4^+ availability in both substrates. Moss disruption increased seedling growth rates as well as their foliar N and P concentrations in both substrates and these variables remained higher in *P. schreberi* than in *Sphagnum* spp. within a given treatment. Seedling growth was positively correlated to substrate N_{tot}, NH_4^+ and DON concentrations, and to foliar N and P concentrations, and negatively to substrate C/N and ericaceous shrub cover. Disruption of the moss carpets without mineral soil mixing improved black spruce seedling growth and nutrition in both moss types but the superiority of *P. schreberi* compared to *Sphagnum* spp. as a growing substrate remained present.

Keywords Black spruce · Boreal forested peatlands · Foliar nutrition · *Pleurozium* · *Sphagnum* · Seedling growth · Substrate disturbance

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B. Lafleur (✉) · N. J. Fenton · Y. Bergeron
NSERC-UQAT-UQAM Industrial Chair in Sustainable Forest Management,
Université du Québec en Abitibi-Témiscamingue,
445 boul. de l'Université,
Rouyn-Noranda, QC J9X 5E4, Canada
e-mail: benoit.lafleur@uqat.ca

D. Paré
Natural Resources Canada, Canadian Forest Service,
Laurentian Forestry Centre,
1055 du P.E.P.S., P.O. Box 10380, Stn. Sainte-Foy,
Québec, QC G1V 4C7, Canada

Introduction

Throughout the boreal forests of North America and Eurasia, a moss layer, composed mainly of feathermosses (e.g. *Pleurozium schreberi* [Bird.] Mitt.) and *Sphagnum* spp., dominates the understory. The present study aimed to describe the effect of physical disruption of the moss layer on soil conditions and early tree growth. Through its effects on soil temperature, moisture and nutrient availability, the moss layer influences several ecosystem processes such as net primary production (Bisbee et al. 2001;