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First-year growth response of cold-stored, nursery-grown aspen planting stock

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Abstract This research examined the first year growth characteristics of cold stored and transplanted nursery-produced aspen (*Populus tremuloides*) seedlings (container and bareroot (BR)) and compared it to the growth of seedlings that had not been transplanted (established from germinants in the field) and therefore had an unrestricted root system (UR). Prior to planting, nursery-produced seedlings were placed in cold storage (–3°C) and root growth potential (RGP) and total non-structural carbohydrate (TNC) root reserves were tested at 0, 10, 75 and after 150 (container) and 190 days (BR) of storage. Both container and BR stock had much lower root to shoot ratios (RSRs) and root carbohydrate reserves compared to UR seedlings after 170 days. During storage, root reserves in container stock declined faster than in the BR and UR seedlings. RGP in all nursery stock was the highest after 75 days of storage, while longer storage resulted in shoot dieback and reduced root growth. After the first growing season, UR seedlings were one tenth the size of the nursery stock; however, in the second growing season they had no stem dieback and grew twice the height and stem diameter. The higher RSRs and root reserves in the UR seedlings was likely caused by early bud set in its first year of growth. This suggests that inducing bud set earlier in the growing regime might allow seedlings to increase root mass and carbohydrate reserves.

Keywords Carbohydrate reserves · Carbon allocation · Intensive silviculture · Plantation forestry · *Populus tremuloides* · Seedling quality

Introduction

Nursery-grown native aspen (*Populus tremuloides* Michx.) seedlings are being tested to establish intensive fast growing tree plantations in the boreal region of Canada.

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