

Managing plantation density through initial spacing and commercial thinning: Growth and yield results from a 60-year-old red pine experiment

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Introduction

Stand density affects competition; hence, it has impacts on tree growth, wood characteristics and survival. In plantation forestry, density management usually aims to increase overall stand and stem quality, reduce rotation age and increase product value. Silviculturists manage stand density by varying spacing during planting and later on through thinning, usually after trees have reached a commercial size.



Long-term studies investigating the main and interacting effects of initial density and thinning are highly valuable; they provide empirical data to support decision-making, and are used in growth and yield modelling. Such information is of particular interest for the management of *Pinus resinosa*, a fast-growing species with potential for high-value products.

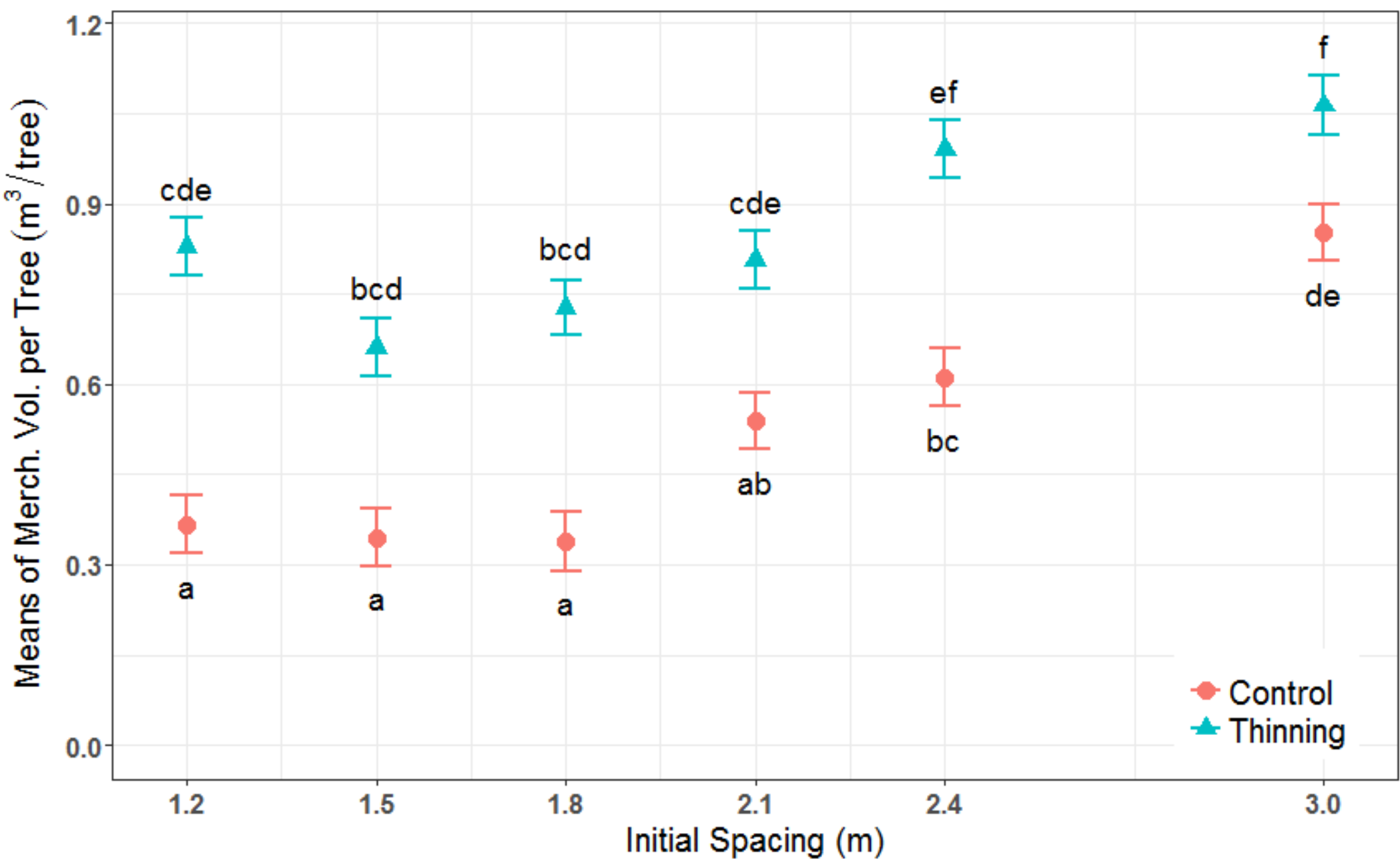
Methods

- A 60-year-old experimental site located at the Petawawa Research Forest in the Great Lakes–St. Lawrence forest region, comprising all combinations between six initial spacings and the presence/absence of commercial thinning (CT).

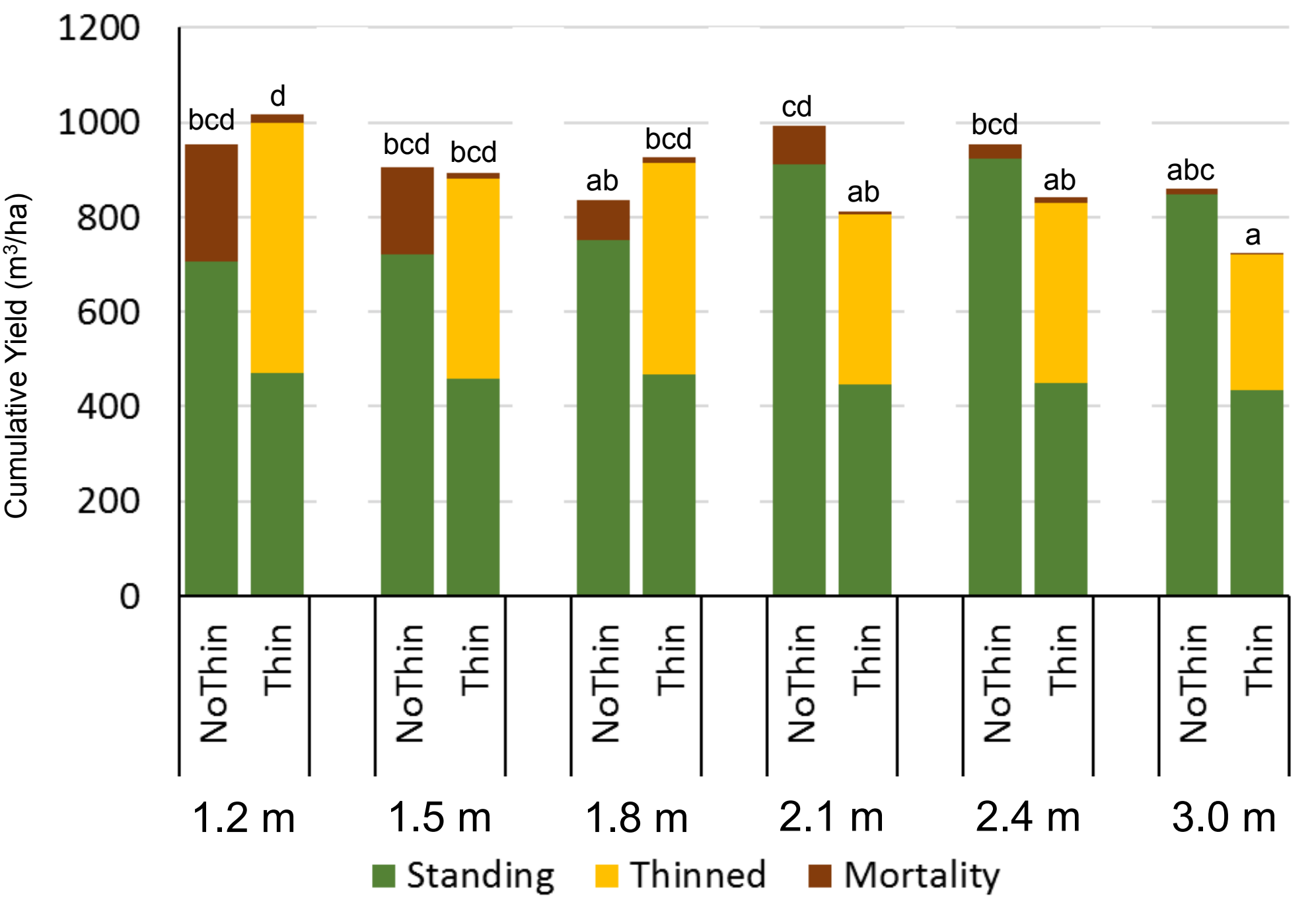


- The CT regime, initiated at age 30, removed 30% of the average pre-treatment basal area (BA), with a resulting target BA of 37.9 m² ha⁻¹ in each spacing treatment. By 2013, four CT entries had been conducted with the same BA target.

Preliminary results



- In control plots, mean tree size increased as initial spacing increased, but stand BA and gross merchantable volume of standing trees peaked at 2.1–3.0 m.
- In thinned stands, similar trends with spacing were evident for individual tree size, although piece sizes were larger.



- Cumulative yield (live + harvested + mortality) was similar between spacings for both thinned and unthinned stands. Despite capturing mortality through thinning in most spacings, cumulative yield was greater in unthinned stands for the 2.1 spacing, suggesting that thinning resulted in under-utilized growing space.