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ORIGINAL ARTICLE

Long-term effects of site preparation and postplanting vegetation control on *Picea glauca* survival, growth and predicted yield in boreal British Columbia

JACOB O. BOATENG[1], JEAN L. HEINEMAN[2], LORNE BEDFORD[1], GEORGE J. HARPER[3] & AMANDA F. LINNELL NEMEC[4]

[1]*Forest Practices Branch and* [3]*Research Branch, BC Ministry of Forests and Range, PO Box 9513 Stn. Prov. Govt, Victoria, BC, Canada V8W 9C2,* [2]*J. Heineman Forestry Consulting, 2125 E. 5th Ave., Vancouver, BC, Canada, V5N 1M5, and* [4]*International Statistics and Research Corp., PO Box 496, Brentwood Bay, BC, Canada, V8M 1R3*

Abstract

The 19–20-year effects of mechanical site preparation, windrow burning, chemical site preparation, and postplanting vegetation control on survival and growth of planted white spruce are reported from two boreal sites in British Columbia, Canada. Survival differed between treatments at both sites, but was relatively good (≥77%) even in untreated plots. Current data regarding the proportion of spruce that were physically overtopped by vegetation and previous results from related soils and vegetation studies suggest that lasting reductions in tall shrub and aspen abundance were more important to spruce growth than early microenvironmental effects associated with manipulating the rooting environment. At Inga Lake, postplanting vegetation control produced a 13-fold increase in spruce volume over the control after 19 years, which was statistically equivalent to increases resulting from fine mixing, plow-inverting and windrow burning site preparation treatments. At Iron Creek, chemical site preparation and plow-inverting quadrupled spruce volume, whereas mounding, patch scarification and disc trenching were ineffective. Growth and yield simulations using treatment-specific site index curves for Inga Lake suggested that rotation length could be shortened by 12–16 years through the use of site preparation or postplanting vegetation control. However, untreated areas, due to the relatively good survival of white spruce at age 19, were predicted to produce equivalent volume if left to grow to mean annual increment culmination age.

Keywords: *Boreal, burning, chemical site preparation, mechanical site preparation, postplanting vegetation control, TASS, white spruce.*

Introduction

In boreal regions of British Columbia (BC), Canada, site preparation is used on harvested forest sites to improve microenvironmental conditions for conifer seedling establishment and early growth. Objectives include increasing rooting zone soil temperature and aeration, improving soil drainage, increasing nutrient availability, and reducing the abundance of neighbouring vegetation to improve light availability and decrease the risk of physical damage (e.g. Örlander et al., 1990; Spittlehouse & Childs, 1990; Spittlehouse & Stathers, 1990; Sutton, 1993).

In BC, mechanical site preparation (MSP) techniques that manipulate forest floor and upper mineral soil layers to enhance seedling microclimate and reduce vegetation abundance (e.g. Draper et al., 1985; McMinn & Hedin, 1990; Sutton, 1993; Fleming et al., 1996; Krasowski, 1996) are more commonly applied than either broadcast burning or chemical site preparation, which do not physically disrupt soil (BC Ministry of Forests and Range, 2007). Interest in MSP peaked in the mid- to late-1980s as a result of legislated changes regarding reforestation responsibilities (Knight, 1990), government initiatives to reduce the number of

Correspondence: J. O. Boateng, Forest Practices Branch, BC Ministry of Forests and Range, PO Box 9513 Stn. Prov. Govt, Victoria, BC, Canada V8W 9C2. E-mail: Jacob.Boateng@gov.bc.ca

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