

IMPACTS OF AERIALY APPLIED HEXAZINONE ON *PINUS BANKASIANA*, *PICEA MARIANA*, AND ASSOCIATED COMPETITIVE SPECIES: FIFTH-YEAR POST-TREATMENT RESULTS

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This study, established near Raith, Ontario, (48° 51' N, 89° 47' W) was designed to determine appropriate rates for aerial application of hexazinone on coarse-textured soils in northern Ontario. A randomized split-split plot design consisted of three blocks, each containing four 2-ha treatment plots. Three concentrations of hexazinone (1, 2, and 4 kg ha⁻¹) were applied at 45 l ha⁻¹ by helicopter in May 1987. Each block also contained an untreated control. Twelve permanent planting plots (16.5 m x 12.0 m) were systematically located within each of the treatment plots. These plots were either hot- or deferred-planted with 40 *Pinus banksiana* or *Picea mariana*. In addition, 33 circular (5-m²) vegetation monitoring plots were systematically established across each treatment plot. Twelve of the circular plots occurred in the planted areas, and 21 occurred in un-planted areas.

Survival, height, and diameter growth were monitored annually, through the fall of 1991. Jack pine container stock planted 1 month after hexazinone treatment at 2 and 4 kg a.i./ha suffered 12% greater mortality than trees planted 1 year later (fig. 1). However, the benefits of early establishment and weed control offset these early losses attributable to decreased survival. Hot-planted areas supported equal per hectare volumes at age 4 and 2.3-fold more volume than deferred-planted areas at year 5 (fig. 2). Black spruce container and bareroot stock exhibited high tolerance to hexazinone throughout the range of rates tested. Overall, a 1-year delay in planting following chemical site preparation resulted in stem and stand volumes that were less than half of those observed

in the hot-planted areas. Growth response was generally proportional to the level of weed control applied, with 4-kg treated areas supporting volumes twofold to fourfold greater than those on untreated areas. The trial illustrates the significant growth advantages associated with early crop establishment and weed control. Further information on the crop response can be obtained from Pitt *et al.* (1999).

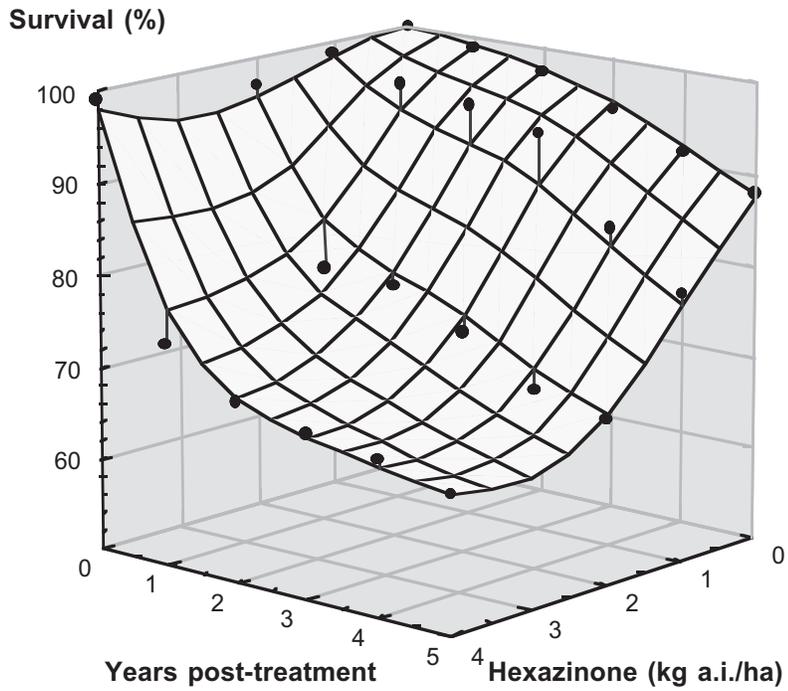
Canonical variate analyses of cover values of competitive species indicate that the plant community composition and relative abundance of species were similar on the 0, 1, and 2 kg ha⁻¹ with the 4 kg ha⁻¹ being the most dissimilar. Non-parametric multiple comparisons of individual competitive species *Aster* spp., *Cornus canadensis*, *Populus* spp., *Rubus ideaus* and grasses were significantly reduced by hexazinone. Five species, *Alnus* spp., *Dievula lonicera*, *Epilobium angustifolium*, *Ledum groenlandicum*, and *Salix* spp., were not significantly reduced on any of the hexazinone-treated plots. Cover of *Vaccinium* spp. increased significantly on all hexazinone-treated plots.

REFERENCE

- Pitt, D.G.; Kishka, C.S.; Bell, F.W.; Lehela, A. 1999. Five-year performance of three conifer stock types on fine sandy loam soils treated with hexazinone. Northern Journal of Applied Forestry. (In press).

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a) Hot-planted (t = 0; June 1987)



b) Deferred-planted (t = 1; May 1988)

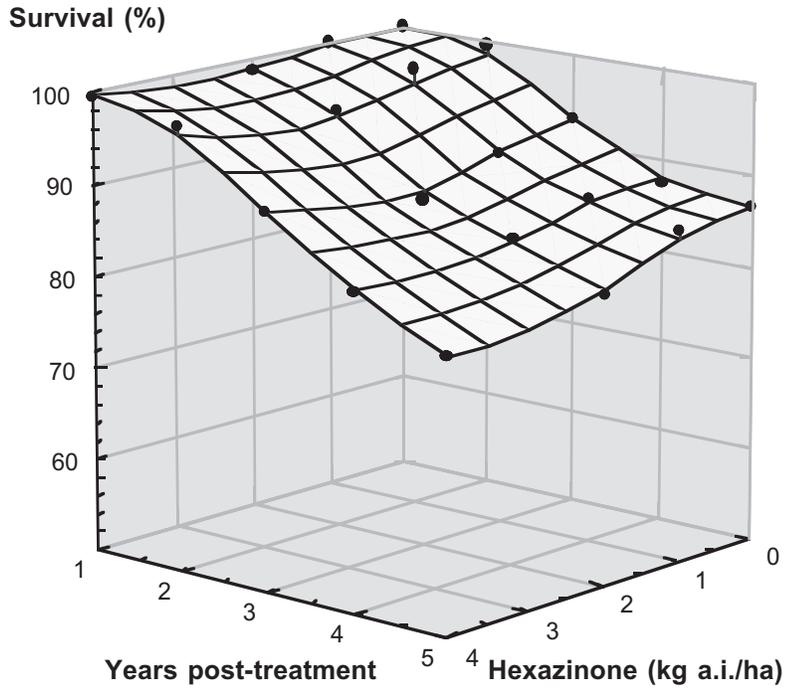
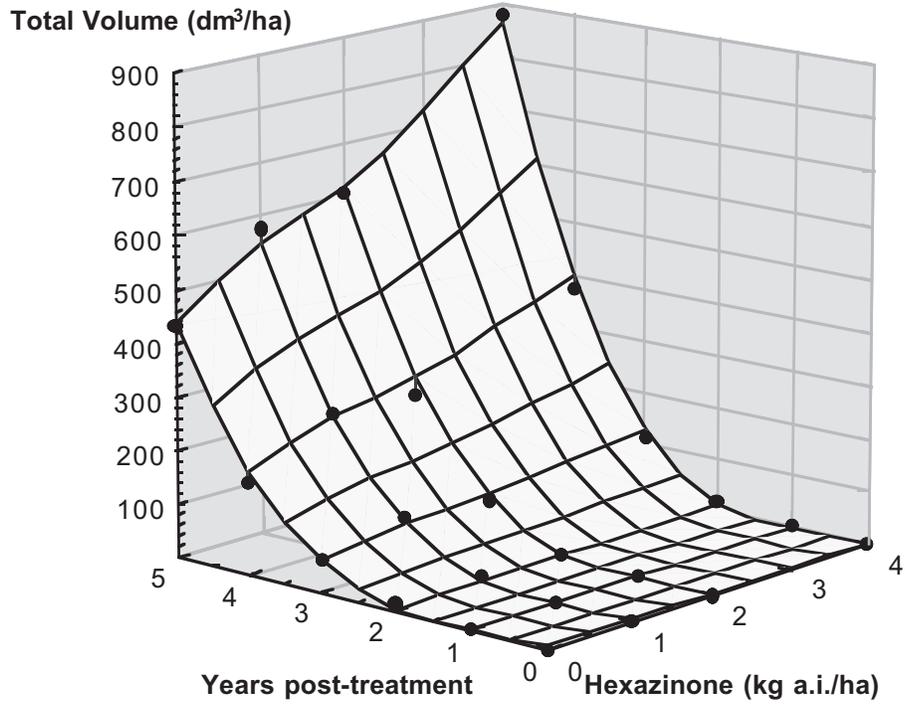


Figure 1. Survival of jack pine container stock a) hot-planted and b) deferred-planted following site preparation with hexazinone. Each plotted point represents the mean of 80 trees. Back-lit numbers reference points made in the text.

a) Hot-planted (t = 0; June 1987)



b) Deferred-planted (t = 1; May 1988)

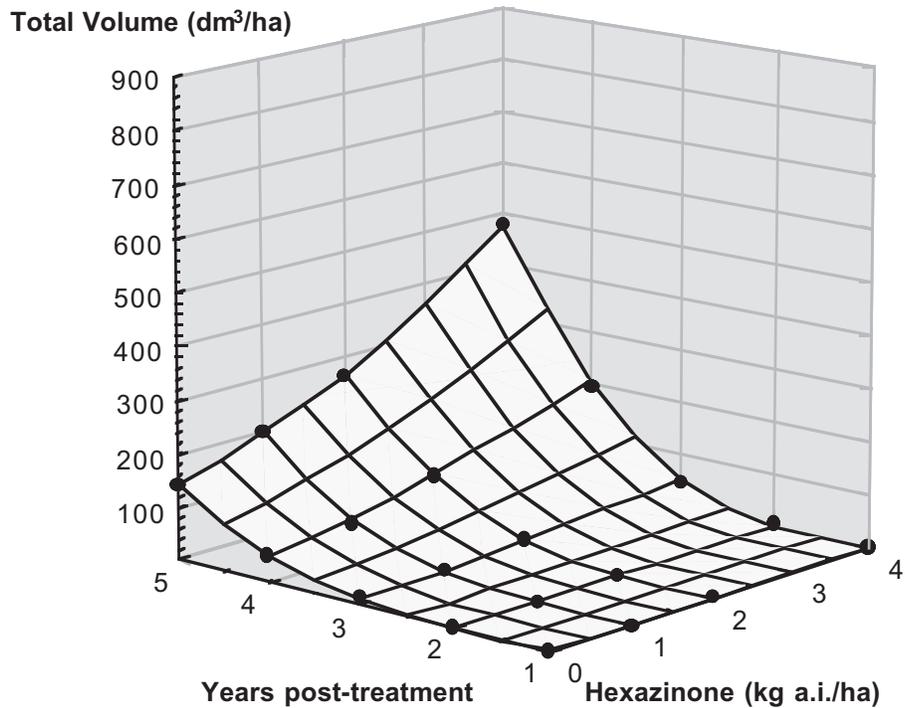


Figure 2. Stand growth (volume/ha) of jack pine container stock a) hot-planted and b) deferred-planted following site preparation with hexazinone. Each plotted point represents the mean of 80 trees. Back-lit numbers reference points made in the text.