Research Memo

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Hydrophylic Polymers: Their Use with Interior Douglas-fir and Lodgepole Pine

INTRODUCTION

Douglas-fir and lodgepole pine seedlings are frequently planted in the interior of British Columbia in areas subject to severe drought stress during the summer months. Recent investigations with hydrophylic polymers have demonstrated that these compounds can absorb many times their dry weight in moisture and that this characteristic can ameliorate the endogenous drought stress when the roots of plants are treated with these materials before planting. **This study was designed to examine the effects of three hydrophylic polymers, Alcosorb® AB3, Sta Wet®, and Expand® on the survival and growth of Douglas-fir and lodgepole pine seedlings under both nursery and field plantation conditions.**

THE PROJECT

Roots of 2-year-old Douglas-fir and lodgepole pine bareroot seedlings were dipped in solutions (20 gL^{-1}) of each of the above compounds. One hundred seedlings of each species for each compound, together with 100 untreated control seedlings, were then planted in a nursery bed in early May. Fifty seedlings of each species and treatment were planted in five 10-seedling rows, with species and treatment assigned at random in a portion of the bed covered to intercept precipitation. The remaining 50 seedlings per treatment and species were planted in a similar design in an uncovered portion of the same bed. One hundred seedlings per treatment and species and 100 untreated control seedlings of each species were outplanted in a fenced forest site near Savona in mid-May 1986. The plantation was established with a completely random design. The plantation is at an elevation of 1250 m in the IDFb subzone. The ecosystem association is IIF; the surface soil is a loam; the subsurface is a clay loam. The area was harvested in 1982; site prepared and planted in 1984, though the resultant plantation was unsuccessful; and site prepared again in 1986 before establishment of the plantation. This last site preparation included ripping followed by scarification with a "shark-fin" barrel. The high soil water content at the time of site preparation largely obviated the intent of the scarification, which was to mix the organic material into the soil. The seedling phenology was monitored in the nursery trials, and seedling survival and growth were monitored at the end of the growing season in both areas.

RESULTS

No significant effect of treatment was shown in the trial. Although all the Douglas-fir seedlings survived in both the nursery bed and the field plantation, and only seven lodgepole pine seedlings died in the nursery trial and only 15% in the field plantation, these mortality data are not significant. Similarly, there was no significant treatment effect on diameter or height growth for either species in either planting area. However, the summer of 1986 was wetter than normal, especially in the period before mid-July. As a result, none of the seedlings, even those in the covered nursery bed, experienced a significant moisture stress before initiating dormancy. Even during the normally dry late summer period, the maximum soil moisture tension recorded in the field plantation was 1 MPa in the upper 20 cm of the soil horizon. Data from other trials in which moisture-conserving materials were applied to seedling roots are inconclusive. Some scientists have reported delayed or reduced mortality of treated seedlings; and others have supported the present results.

CONCLUSIONS

Application of hydrophylic polymers to seedling root systems before planting did not increase seedling survival or growth of Douglas-fir or lodgepole pine seedlings planted under nursery or field plantation conditions. However, neither planting area experienced severe drought during the growing season immediately after plantation establishment, so it is possible that the lack of treatment effect reflected the lack of drought stress.

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