

Competitive Relationships in Forest Restoration: Impact of Cover Crops and Fertilization on Tree and Understory Development

Alia E. K. Snively

Abstract

Initial reclamation practices affect the early development and future recovery trajectories of tree and understory species on reclamation sites. In this thesis I explored the effects of yellow sweet clover (*Melilotus officinalis*) as a cover crop on tree performance and competition control in forest floor material which was salvaged and directly placed at two different depths (15 cm and 40 cm). Sweet clover suppressed the establishment of some competing species; however total vegetation cover was not impacted and total mortality of planted *Populus tremuloides*, *Pinus contorta*, and *Picea glauca* seedlings was greater in sweet clover plots. Tree seedlings had better annual growth and lower mortality in the 40 cm salvage and placement depth treatment, potentially due to a more diluted seed bank which decreased dominance of competitive species. In a second study, I assessed the impact of four fertilizer treatments (control, 250 kg/ha immediately available fertilizer (IAF), 500 kg/ha IAF, and 670 kg/ha controlled release fertilizer) applied to two different capping materials (forest floor material (FFM) and a peat-mineral mix (PMM)) on initial forest vegetation development. The application of fertilizer did not affect average species richness in either capping material; however fertilization promoted increased cover of grasses in the FFM. Over time the number of annuals/biennials as well as non-native species decreased in both capping materials and the number of desirable forest understory species increased in the FFM.