

Tree seedling survival after planting under varying treatments on reclaimed mine land¹

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Abstract: Reforestation of previously mined lands is essential for improving ecosystem services and restoring forest ecosystems in the Appalachian region of the United States. At *the Wilds*, a conservation and research facility in southeast Ohio, forests historically dominated the landscape. Reclamation of the previously strip mined land occurred in the mid to late 1900s. Initial reclamation involved reforestation, however after federal regulations in the 1970s reclamation primarily involved grassland establishment. Reforestation projects in these grassland areas have had limited success due to factors such as soil compaction, low nutrient availability, and competition from invasive grasses. To increase tree seedling survival rate, an experiment was designed to test multiple planting treatments: fertilization, Terra-Sorb[®] root dip, post-planting herbicide application, and a control. In the spring of 2016, roughly 5,000 tree seedlings were planted representing five native hardwood species. By October of 2016, white oaks (*Quercus alba*) had the highest survival rates for the species planted while tulip poplar (*Liriodendron tulipifera*) had the lowest. Survival rates also varied by treatment method with fertilized plots showing the highest survival (94.8%) and herbicide plots having the lowest (88.1%). Both tree species and treatment method were shown to have a significant effect on seedling survival rates. Survival results from treatment methods were unexpected as they run contrary to contemporary tree planting protocol, where sites are typically not fertilized at establishment and are often sprayed with herbicide to reduce vegetative competition. Herbivory was observed to be higher in plots with less vegetative cover, thus reducing seedling survival rates. This suggests herbicide application could have increased mortality through increasing herbivory. Further investigations will survey mortality by herbivory to determine if treatment method affects herbivory and survival. The results from this study will help guide future reforestation projects at *the Wilds* and on other reclaimed mine lands in the Appalachians.

Additional Key Words: Reforestation

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