

1ST YEAR PERFORMANCE OF NORTHERN RED OAK (*QUERCUS RUBRA* L.) ON RECLAIMED MINED LANDS IN INDIANA

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Northern red oak (*Quercus rubra* L.) seedlings were planted April 2003 on two reclaimed surface coal mines in Indiana, USA. Poor soil physical properties, low nutrient availability, and severe compaction characterize these sites. These characteristics can result in low seedling survival and poor performance, which may lead to conversion of the land to other uses. For reclamation to forestland to be effective, seedling establishment success must be improved. The objectives of this research are to compare the effectiveness of four stocktypes and assess the contribution of controlled-release fertilizer (CRF) and mycorrhizal inoculation (MI) to survival and performance of northern red oak on reclaimed mined lands. Northern red oak is known to survive on a variety of sites and has a high commercial value and was therefore selected as the trial species. The four stocktypes consisted of June-sown (Ju) and January-sown (Ja) containerized seedlings, and standard-density (Sd) (75 seedlings/m²) and low-density (Ld) (21 seedlings/m²) 1+0 bareroot seedlings. Three treatments were applied to each stocktype: MI, addition of CRF, and both MI and CRF. A control, with neither MI nor CRF, was established for each stocktype. Initial height and root-collar diameter (RCD) were recorded immediately after outplanting. Competing vegetation was controlled by herbicide application and a 2.3 m fence was erected to minimize animal damage. In October 2003, survival was assessed and height and RCD were measured for all surviving seedlings. Survival for Ld (68%) and Sd (69%) seedlings was greater than that of Ju seedlings (50%), which also had higher survival than Ja seedlings (30%). There was a significant stocktype × CRF interaction for Ju containerized seedlings, whereby survival was lower for seedlings that received CRF (64%) than for those that did not (35%). Height growth was greater for Ld seedlings than both Ju and Ja. Sd seedling height growth was also greater than that of Ja. Differences in RCD growth were not significant between any treatments. Leaf water potential (LWP) was measured to evaluate plant moisture stress. Ja seedlings were less stressed than Ld and Sd seedlings, and Ju seedlings were less moisture stressed than Ld seedlings. These differences could be partially attributed to the entire root system of containerized seedlings as compared to the loss of fine roots of bareroot seedlings. CRF increased seedling moisture stress. These results affirm that future research efforts need to focus on producing a stocktype that is able to excel on former surface coal mines.

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