

Powell River Project Report 2011

Tree Stock and Fertilizer Effects on Black Locust Biomass Production on Mined Lands

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Introduction and Methods

Biomass production on mined lands may become a economically viable method for producing relatively carbon neutral fuel stock for energy production or for carbon sequestration. Previous research trials at the Powell River Project (Wise, VA) have indicated that black locust (*Robinia pseudoacacia*) is a species of interest for production of biomass on mined lands, because of its high planting success, rapid growth, and relatively dense wood compared to other more commonly grown biomass species such as hybrid poplar (*Populus trichocarpa* L. x *Populus deltoides*).

Black locust's generally poor stem form is a disadvantage when using it for biomass production. In open growing conditions it can grow multiple stems and could be more costly to harvest or transport compared to single stem trees. This study is intended to test if improved stem form can be achieved through nursery selection. Treatments include black locust seedlings that were culturally selected from parents with superior stem form vs. standard seedlings. We also included an additional fertilizer treatment on half of each of these seedling types to test for limitations due to soil quality.

We included three sites, in Wise County, VA, as replicate blocks for this study. In December, 2007, each site was disked and ripped to till under existing vegetation and to alleviate possible compaction, leaving loose soil material for tree planting and root growth. This was accomplished with a heavy forestland disc harrow used to break up the soil, followed by a second pass to deep till and mound the tree planting row. In the fall of 2009, all woody vegetation was removed from the plot areas and 2 m diameter circular planting areas were sprayed with 2% glyphosate to remove competing vegetation. In December of 2009 we planted the seedlings at 2.44 m spacing with standard black locust trees as border trees between measurement trees. In order to reduce site quality heterogeneity at each site we included two replications of the seedling type and fertilizer treatment at each site (Figure 1). After planting we applied 118 ml of 19:19:19 granular fertilizer in a 0.3 m circle around each seedling in one half of the treatment plots. Treatment combinations and locations were randomly assigned to each treatment plot using a random number generator. Each treatment comprised a 5 x 5 square plot of trees giving 50 measurement trees for each treatment combination at each block. Due to intense sprouting of woody weeds, we sprayed the plots again with 2% glyphosate and a 2% mix of 2,4-D, 2,4-DP and dicamba.

We measured the trees in the fall of 2010. Survival, height, and ground line diameter were measured. At the time of measurement, intense woody weed sprouting was noted. We plan to

re-cut these woody weeds and to stump spray in the spring of 2010. We will also re-spray the tree circles with glyphosate and a pre-emergent herbicide.

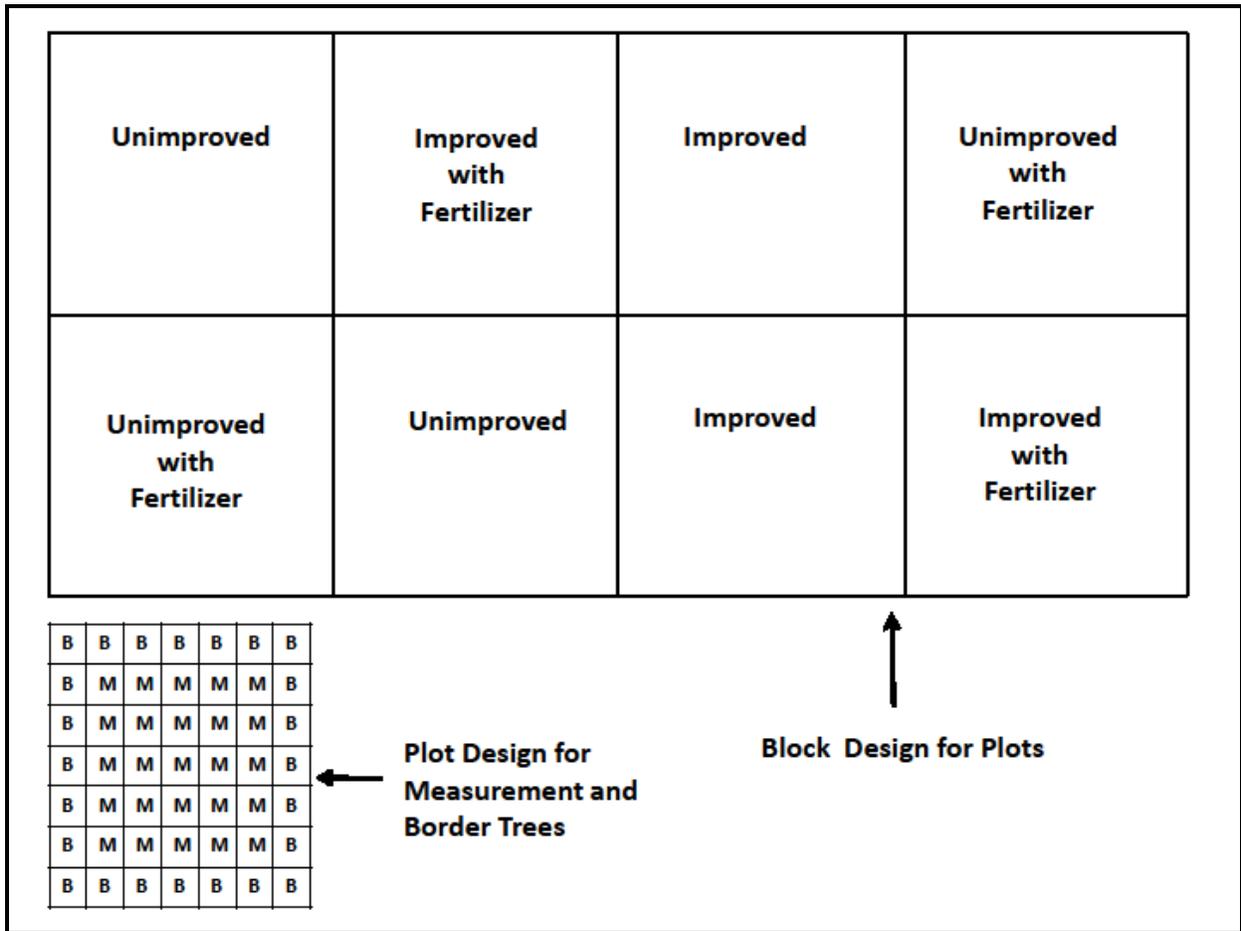


Figure 1. Example of block and plot design for black locust biomass production trial on mined lands in Wise county, VA. M=measurement tree. B=border tree.

Results

At year one, mean survival for the study was 79% with 75% for the improved trees and 84% standard trees (Table 1). Survival at the sites was variable with a range from 69% at the Across the Road block to 86.5% at the Bean Gap block. There is little difference in survival between fertilized and unfertilized trees at any of the sites.

Block	#	Height (cm)	Volume (cm³)	#	Height (cm)	Volume (cm³)	Mean Survival (%)
	-----Improved-----			-----Standard-----			
Across the Road							69
Fertilized	34	74.4	75.0	32	70.7	52.1	66
Non-Fertilized	34	90.3	145.6	38	91.7	117.2	72
Red River							83
Fertilized	32	104.9	156.5	45	111.7	212.6	87
Non-Fertilized	43	58.9	44.4	46	97.8	88.4	89
Bean Gap							86.5
Fertilized	39	93.9	191.1	47	121.5	358.1	86
Non-Fertilized	43	71.8	107.3	44	99.7	147.6	87
Mean Survival (%)		75			84		

Table 1. Black Locust survival, height, and volume at three biomass production blocks at year one.

Future Plans

We plan to remove the herbaceous and woody competition from this trial, re-fertilize the plots, and to re-measure in the fall of 2011. At that time, tree growth will be great enough to analyze growth differences between the two genetic stocks across the sites and fertilizer treatments.

Acknowledgements

The authors extend thanks to Alpha Natural Resources and Powell River Project for funding this research. Thanks also to Forestland Group, Penn Virginia Resource Partners, and Red River Coal for their assistance, including grants of access to the experimental sites. Trees were provided by Williams Forestry & Associates. Thanks to Zach Addington, Travis Stanley, and Chris Jackson for field assistance.