

Hybrid Poplar Biomass Production on Appalachian Reclaimed Mine Land: Year 1 Results of Clone Comparison Trials

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Introduction

Use of Appalachian mined lands for biobased products could help increase energy security, enhance the rural economy, and enhance the environment without displacing land for food production. However, achieving a sustainable biomass-based industry is contingent on the breeding, testing and selection of dedicated perennial cellulosic energy crops specifically for this region.

Poplars (genus *Populus*) and their hybrids are widely considered to be the premier woody perennial candidate for bioenergy feedstock production on non-mined land sites. We initiated a clonal comparison trial at the Powell River Project Research and Education Center site in 2009. That trial's background and installation were described with greater detail by Brunner et al. (2009). Here, we report first-year results.

Experimental Approach

Our specific objective was to field test 98 clonally replicated genotypes of three major inter-specific taxa. Trials were established in Spring 2009. Ten inch dormant stem cuttings were planted at a 10 feet x 2 feet spacing in a randomized block design with four replications (Figure 1). Clones (Table 1) were blocked by taxa with border rows for each block. Following second year varietal evaluation, above-ground biomass will be harvested and analyzed (2010), and coppicing ability of the varietals assessed (2011). Initial crop production (growth and yield) models will be developed. Results from these trials will be utilized to select varietals for yield verification studies that will confirm selections of superior first-generation commercial varietals.

Table 1. Summary of hybrid poplar clones being evaluated

Taxon		Number of Experimental Clones
<i>Populus x generosa</i> (<i>P. deltoides</i> x <i>P. trichocarpa</i>)	(DT)	33
<i>Populus x Canadensis</i> (<i>P. deltoides</i> x <i>P. nigra</i>)	(DN)	32
<i>Populus deltoides</i> x <i>Populus maximowiczii</i>	(DM)	33
Total		98

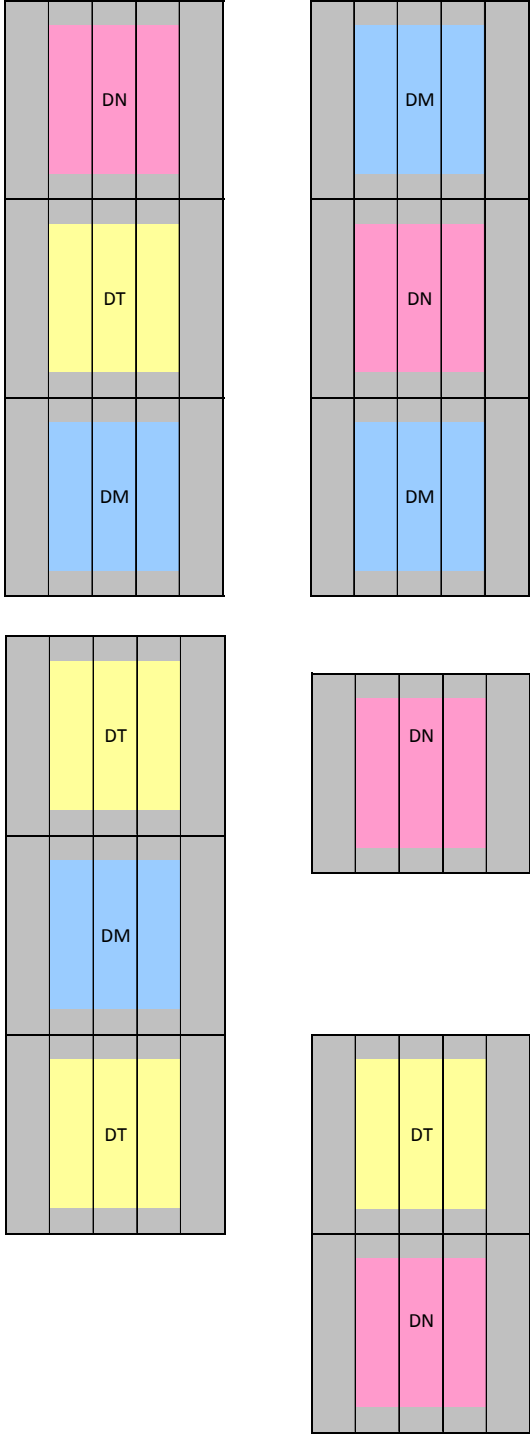


Figure 1. Layout of the hybrid poplar field trial. Gray areas are border plantings (1 row vertical, and two rows at the end of each of the 12 experimental plots). Colored areas are the experimental trials, blocked by taxon as designated in Table 1. Test clones are marked with numbered metal tags.

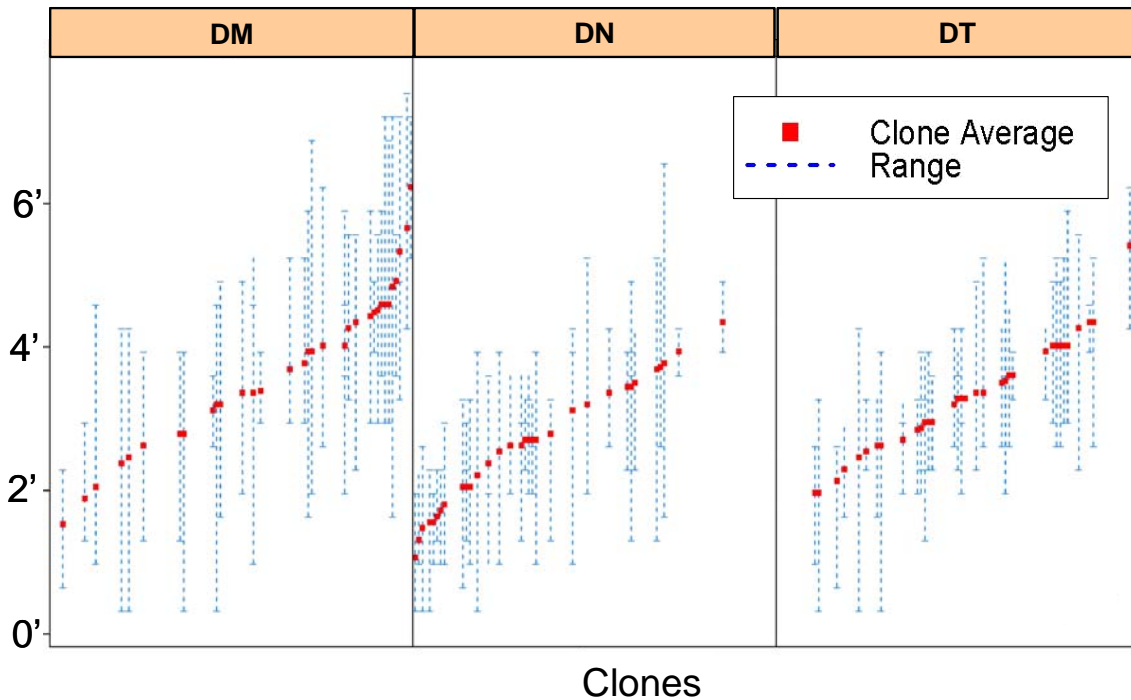


Figure 2. First-year height growth for the hybrid-poplar clones, by taxon.

Preliminary Results

First-year survival was excellent, at >90%. Height growth of surviving trees was highly variable, ranging from <1 foot to >7 feet, with clonal averages ranging from <2 feet to ~6 feet. Average height growth of all clones was >3 feet. Height growth also varied by clone (Figure 2), with *Populus deltoides* x *Populus maximowiczii* taxon containing the largest number of clones with average height growth > 4 feet. Visual evaluation revealed a minor incidence of poplar leaf rust by the fungus *Melampsora*, as >80% of planted clones were visually rated as having “no” or “light” rust, and <20% were rated for rust as “moderate” or “severe” (Figure 3). Second-year growth appears as excellent (Figure 4) and will be measured at the conclusion of the 2010 growing season.

Acknowledgements

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References

Brunner, J. Munsell, J.Gagnon, H. Burkhart, C. Zipper, C. Jackson, A. Fannon, B. Stanton, R. Shuren. 2009. Hybrid Poplar for Bioenergy and Biomaterials Feedstock Production on Appalachian Reclaimed Mine Land. p. 44-48, in: 2009 Powell River Project Research and Education Program Reports. http://www.cses.vt.edu/PRP/Reports_09/Reports_09.html

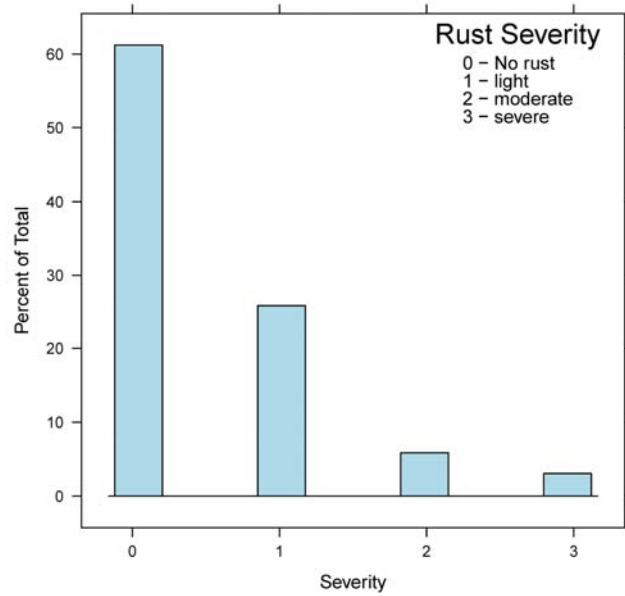


Figure 3. Histogram of poplar leaf rust severity, as evaluated visually at the conclusion of Year 1 growing season.



Figure 4. A section of the hybrid poplar clonal trial during its second year, on 10 August 2010.