Early Survival and Growth of Poplars Grown on North Carolina Piedmont and Mountain Marginal Lands

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The western half of North Carolina has abundant marginal pasturelands that vary greatly in altitude. Our objective was to identify best-performing *Populus* clones on marginal pasturelands representing upper Piedmont (Salisbury, 215 meters above sea level, m.a.s.l.), northern Blue Ridge Mountains (Laurel Springs, 975 m.a.s.l.) and southern Blue Ridge Mountains (Mills River, 630 m.a.s.l.). At Salisbury, height and basal diameter (BD) were significantly related to clones ($p < 0.0001$). Some clones were affected by clone-spacing interaction while spacing affected aboveground wood volume significantly ($p < 0.0001$). At Mills River, survival ($p \leq 0.0011$), height and volume ($p \leq 0.0051$) varied with contrasting significance of some clonal differences between spacings. At Laurel Springs, survival varied among clones in 1 m × 1 m spacing ($p = 0.003$) but not 2 m × 2 m spacing while heights and volumes differed in both spacings ($p \leq 0.0058$). Clone 185 was consistently in the top 10% for height, BD and survival at all sites and spacings while other clones performed variably. Height-BD regressions were affected by clones, spacing and sites. Volume had no clear correlations with precipitation, photosynthetically active radiation, temperature and altitude across sites while height correlated with precipitation. Our results compared favorably with published results in other U.S. regions, and show short-rotation poplars have efficacy in Piedmont and mountain regions if the right clones in terms of growth/productivity, survival and disease-resistance are selected. Larger clonal variations are expected as competition increases, and highlight importance of experimentally determining suitable clones for specific sites.

Keywords: bioenergy feedstock; *Populus* genotypes; marginal lands; site adaptability

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Solomon Ghezehei is a postdoctoral researcher in the Dept. of Forestry and Environmental Resources, NC State University, after completing his graduate studies at the University of Pretoria, South Africa. Solomon is a co-PI of a bioenergy forest demonstration project in Western NC, and his current work includes managing *Populus* studies in western NC, *Populus* productivity modeling, and economic feasibility analyses for SRWCs. Latest publications include: Ghezehei SB, Nichols EG and Hazel DW (2015) Early clonal survival and growth of poplars grown on NC piedmont and mountain marginal lands. *BioEnergy Research*. DOI 10.1007/s12155-015-9707-x; Ghezehei SB, Shifflett SD, Hazel DW and Nichols EG (2015) SRWC bioenergy productivity and economic feasibility on marginal lands. *Journal of Environmental Management,* 160, 57-66.