

Genetic and environmental factors affecting early rooting of six *populus* genomic groups: Implications for tree improvement

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Genetic and environmental factors affect the early rooting of *Populus* planted as unrooted hardwood cuttings. *Populus* genotypes of six genomic groups were tested in numerous studies for the quantitative genetics of rooting, along with effects of preplanting treatments and soil temperature. Genetics data (e.g. heritabilities, correlations) were important for guidelines that incorporate rooting ability as a criterion in the formulation of strategic and/or operational breeding plans. Genotype $\times$ environment interactions were useful for refining clonal recommendations over regional scales. Tree improvement implications were derived from testing the effects on rooting of: 1) parental stool shoot collection date (across clones, collect whips after 23 Feb.), 2) position of the cutting from the parental stool shoot (basal cuttings better for most genomic groups, while apical cuttings rooted better for *P. deltoides* $\times$ *P. maximowiczii* clones), 3) preplanting bud removal intensities (rooting is not affected with $\leq 50\%$ of buds removed), and 4) soil temperature (above-average rooting with 4 consecutive days $> 14^\circ\text{C}$ at 20-cm depth). This collective information helps scientists make decisions about testing across regional scales, growers increase the success of plantation establishment, and the general public get wood products while maintaining native forests for aesthetics.

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