**Evaluating Hybrid Poplar Rooting. I.**
**Genotype x Environment Interactions in Three Contrasting Sites**

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We need to learn more about environmental conditions that promote or hinder rooting of unrooted dormant hybrid poplar cuttings. Planting cuttings and recording survival after the growing season is not suitable to keep up with industrial demands for improved stock. This method does not provide information about specific genotype x environment interactions. We know very little about genotypic rooting responses to variable environmental conditions. Yet tests are finally cost effective with current technologies.

We tested 21 clones from 5 pedigrees (pure *Populus deltoides*, *P. deltoides* x *P. maximowiczii* $F_1$ hybrids, *P. deltoides* x *P. nigra* $F_1$ hybrids, *P. nigra* x *P. maximowiczii* $F_1$ hybrids, and (*P. deltoides* x *P. trichocarpa*) x *P. deltoides* backcross hybrids) at 3 sites (Ames, IA, Waseca, MN and Westport, MN) and 3 planting dates (late-April, early-May, late-May, 2002). The experimental design was randomized complete blocks with 12 blocks and 1 cutting per clone per block. Individual trees were harvested two weeks after planting. Lateral roots, callus roots, callus, shoots, and leaves were dissected from each cutting and oven dried to determine dry weight (g) of each component. Analyses of variance indicated that genetic main effects were minimal throughout the system. Interactions among genotype, site and date were the most important factors influencing root initiation and growth.

Pedigrees did not differ in total root dry weight ($p=0.478$). Pedigree x site and pedigree x date interactions were also non-significant ($p=0.910$ and $p=0.927$, respectively). However, the pedigree x site x date interaction was highly significant ($p<0.001$). In contrast, clones within pedigrees did differ in total root dry weight ($p=0.003$) and clone x site interaction effects ($p=0.010$). But, there were no differences due to clone x date interaction ($p=0.150$). The clone x site x date interaction was highly significant ($p<0.001$). Therefore, these data suggest that environmental effects heavily govern root initiation and growth. Genotype x environment interactions are also apparent from graphs plotting pedigree versus site x date. By definition we see such interactions due to changes in rank and scale of pedigrees across sites and planting dates.

Without testing across multiple sites and multiple planting dates our ability to acquire knowledge in regard to rooting ability of different pedigrees declines. Examining broad scales is essential if we are to find genotypes that root well given location and timing of planting. Although such tests require extensive time, labor, and money, this study validates the necessity for intensive broad-scale rooting studies. We believe additional testing for specific genotype x environment interactions across regional scales is needed to improve the reliability of locally based clonal recommendations.

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