

Survival and growth of poplars and willows grown for phytoremediation of fertilizer residues

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Background: Species and hybrids belonging to the genera *Populus* (poplar) and *Salix* (willow) have been used successfully for phytoremediation of contaminated soils. However, genotypic screening using phyto-recurrent selection is necessary prior to large-scale deployment because of the broad amount of variation among and within poplar and willow clones.

Objectives: Thus, in order to identify promising genotypes for potential use in future phytotechnologies, the objectives of the current study were to: 1) evaluate the genotypic variability in survival, height, and diameter of poplar and willow clones established on soils heavily contaminated with fertilizer residues (i.e., nitrates), and 2) assess the genotypic stability in survival and diameter of selected poplar clones after one and eleven growing seasons.

Methods: We evaluated these traits after first year budset by testing 27 poplar and 10 willow clones planted as unrooted cuttings, along with 15 poplar clones planted as rooted cuttings. The cuttings were planted in randomized complete blocks at an agricultural production facility in the Midwestern, United States. After eleven growing seasons, and using phyto-recurrent selection, we surveyed survival and measured diameter of 27 poplar clones (14 unrooted, 13 rooted) that were selected based on superior survival and growth throughout plantation development.

Results: There was a broad amount of genotypic variability in survival, height, and diameter during establishment. Overall, willow exhibited the greatest survival, while poplar had the greatest height and diameter. At eleven years after planting, superior clones were identified that exhibited above-average diameter growth at establishment- and rotation-age, most of which had stable genotypic performance over time.

Conclusions: From these results, selection of specific clones was favorable to genomic groups, based on the geographic location and soil conditions of the site.

Keywords: genotypic stability; genotypic variability; phytotechnologies; *Populus*; *Salix*

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