

Phyto-recurrent selection: A tree improvement strategy for selecting genotypes used in phytoremediation

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The success of using *Populus* and *Salix* for phytoremediation has prompted further use of leachate as a combination of irrigation and fertilization for the trees. A common protocol for such efforts has been to utilize a limited number of readily-available genotypes with decades of deployment in other applications, such as fiber or windbreaks. However, it may be possible to increase phytoremediation success with proper genotypic screening and selection, followed by the field establishment of clones that exhibited favorable potential for clean-up of specific contaminants. There is an overwhelming need for testing and subsequent deployment of diverse *Populus* and *Salix* genotypes, given current availability of clonal material and the inherent genetic variation among and within these genera. Therefore, we detail phyto-recurrent selection, a method that consists of revising and combining crop and tree improvement protocols to meet the objective of utilizing superior *Populus* and *Salix* clones for remediation applications. Although such information is lacking for environmental clean-up technologies, centuries of plant selection success in agronomy, horticulture, and forestry validate the need for similar approaches in phytoremediation. We bridge the gap between these disciplines by describing project development, clone selection, tree establishment, and evaluation of success metrics in the context of their importance to utilizing trees for phytoremediation.

SRWC Production Systems for Wood Production, Bioenergy and Environmental Services



Pasco, Washington, USA
September 25-28, 2006