

Phytochelatin Synthase Expression Effect on Zinc Interaction with Populus

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Heavy metal uptake and storage is necessitated for bioremediation of toxic metals in the environment. Heavy metal regulating genes have been isolated in small annual plants and have afforded those species with tolerant and accumulating phenotypes. One such gene codes for phytochelatin synthase and at high levels is correlated with increased heavy metal tolerance and accumulation in these annual plants. In perennial forest species, little is known about the genes involved in the heavy metal regulating pathway. However, identification and function of homologous genes in forest species is necessitated for their use as bioremediation agents. Thus the objective of this study is to isolate a *Populus* gene homologous to a known heavy-metal related gene and determine its role in heavy-metal regulation. A *Populus* gene homolog to a phytochelatin synthase (PC) coding gene in the zinc hyper-accumulator *Thlaspi caerulescens* was identified using a phylogenetic analysis. The gene transcript was isolated from *P. trichocarpa* tissue, sequenced, and cloned into an over-expression vector. Tissue was transformed with the gene construct and plants were generated from tissue culture. A 3x4 factorial design was used in which two lines of *Populus* with the over-expressed PC gene and a control were subjected to four concentrations of zinc in the growth medium. This paper will discuss the effect various levels of zinc had on the plants which will indicate the functionality of the homologous gene and if expression effects mimic those found in other species. Similar gene functionality with hyper-accumulators would afford *Populus* the ability to become heavy metal tolerant offering a new avenue for bioremediation.