# PERTURBATION OF TUBULIN EXPRESSION AND POSTTRANSLATIONAL MODIFICATIONS IN *POPULUS*

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Microtubules form part of the cytoskeleton and are involved in many dynamic processes, including cell wall deposition. Alpha- and beta-tubulin monomers polymerize into microtubules and these monomers are encoded by multi-gene families in *Populus*. An unusually high ratio of beta-to-alpha tubulin gene family members distinguishes *Populus* from many other plant species. In addition, a high degree of C-terminal sequence variability is predicted for *Populus* tubulins. This variation may impact various posttranslational modifications (PTMs) known to occur at or near the C-terminus of animal tubulins. In *Populus*, alpha- and beta-tubulins show differential expression patterns and a small subset of genes is preferentially expressed in xylem. We are investigating the roles of this subset of xylem-abundant tubulins during plant growth and development using a transgenic approach. Alpha- and beta-tubulin genes were transformed into *Populus* in various combinations. Genes encoding PTM mimics of alpha-tubulin were also included. The transformation and regeneration efficiency was very low in several rounds of transformation attempts, and the majority of the transformants failed to develop normally. Interestingly, successful regeneration of transgenic plants was obtained only with PTM mimics. Transgenic trees were grown and monitored in the greenhouse. Transgenic plants exhibited altered leaf expansion, which led to greater width-to-length ratios than in wildtype, and in many cases, mature leaves exhibited abnormal curling. The most severe curling occurred in transgenic lines where bark and wood of mature stems was lighter colored than in wild-type. Bark and wood tissues were subjected to various analyses, including metabolic profiling, gene expression, lignin analysis, microfibril angle and wood density. Results from the transgenic experiments indicate that it is possible to engineer novel expression of specific alpha- and/or beta-tubulins to have an effect on growth and wood properties of trees.