Targeting axillary meristem initiation and primordial development to modify plant architecture.

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Poplar (*Populus sp.*) is grown for timber production and, usually on short rotation plantations, as a biomass resource for sustainable energy. Economically important traits are wood quality and yield. Wood quality is highly influenced by tree architecture. Branches and twigs have an unfavorably low wood to bark ratio, reducing the biomass quality. Moreover, knotless growth is important for the production of high grade wood. The effect of tree architecture on the total biomass yield, however, is unclear. High branch numbers could possibly be beneficial and quantity gains could compensate for quality losses.
Shoot branching is the process which determines plant architecture. It is regulated by a complex system involving transcription factors and phytohormones. Transcription factors of the GRAS- (LAS1) and the TCP-family (BRC1) control the number of axillary meristems and thus, lateral buds formed, and the degree of bud outgrowth, respectively. The hormones auxin and the recently identified strigolactones inhibit outgrowth of lateral buds, while cytokinin has a promoting effect.
The aim of this project is to modify poplar architecture to improve wood quality and biomass yield. Tissue-specific (over-) expression of key genes and amiRNA-mediated knockdowns are employed to target transcription factors, lateral bud cytokinin levels, as well as strigolactone biosynthesis and signaling. Transgenic lines in the *Populus* x *canescens* background with reduced or increased branching are being generated to evaluate the combined effects of the branching level on wood quality and biomass yield.
The project is part of the research cooperative PopMass - Development and use of novel gene technologies to increase biomass yield in the woody perennial *Populus sp*.