



Xylem hydraulics and mechanics : where are the tradeoffs ?

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Abstract

The xylem is a complex tissue that covers different key functions in woody plants: 1) it transports water throughout the plant to replace water lost during leaf transpiration, 2) it confers to trunk and branches their stiffness and flexibility, and 3) it stores water, nutrients and carbohydrates. These functions have set contrasted selective pressures on this tissue and shaped its structure during evolution. Understanding how xylem functions relate to xylem anatomy is a challenging issue. Each function is associated to a set of xylem characteristics that can be antagonistic across functions. It is therefore important to identify the tradeoffs between xylem functions. We will focus here on the tradeoffs between hydraulic traits (efficiency versus safety) and the tradeoffs between hydraulic and mechanical traits. A better understanding of the structural and genomic determinants of each function and the exploration of their genetic variability within and across species has recently brought new light on these questions.

Keywords

xylem