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Managing *Eucalyptus* plantations under global changes

Abstracts Book

Water deficiency and potassium supply trigger interconnected signals to modulate wood formation in Eucalyptus

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Fast growing *Eucalyptus* tree is well adapted to various soils and climate environment, but its growth varies strongly according to these factors. Thanks to potassium fertilization, productivity in the south of Brazil is one of the highest in the world. The development of more sustainable cultural practices requires an improved understanding of mineral nutrition, especially in interaction with water stress, which is more and more threatening plant culture. We aimed to characterize the effect of water availability and nutrition supply on wood formation and quality. An experimental design was set up on field with a highly productive *Eucalyptus grandis* clone planted in a split-plot design, with 2 factors tested in interaction: water availability set up with rainfall exclusion system, and K+ fertilization. We analyzed wood properties and performed large scale analysis of transcriptome (RNAseq) and metabolome in developing xylem. These data were integrated using multivariate statistical analyses and co-regulation networks. We identified promising transcription factors potentially involved in the regulation of wood formation. The functional characterization of one candiate in *E. grandis* transgenic roots demonstrated its implication in secondary cell wall biosynthesis, confirming the potential of our system biology approach to indentify new key regulators of wood formation in woody plants.

Keywords: System biology, Correlation networks, Omics integration, Drought, Nutrition, Xylem, Transcription factors, Eucalyptus.

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