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EDITORIAL

Guest editorial special topic "Wood Structure and Ecology"

Achim Bräuning

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How does tree ecological response to environmental forcing translate into wood anatomical structures of the xylem? Which wood anatomical traits represent adaptive responses of a woody plant to environmental stress and which are features varying within the normal range of plasticity of anatomical parameters without adaptive value? What can wood structural properties tell us about the potential fitness of plant species to future environmental stress expected from climate change scenarios? How do trees respond to changes in local hydroclimate in different climatic settings? These important questions were intensively discussed at the international symposium "Wood Structure in Plant Biology and Ecology" (WSE) in Naples, Italy, during 17–20 April 2013. The response of trees and forests to environmental stressors is the key topic of the COST-Action FP1106 STReESS, "Studying Tree Responses to Extreme Events: a Synthesis". In a joint collaborative effort of the international journals Dendrochronologia, IAWA Journal, Tree Physiology, and Trees, the largest part of the contributions presented at this conference are made available to the scientific community.

In the current volume of Trees, four papers using a variety of scientific approaches and addressing different studied tree ecological and anatomical parameters are combined in a special section. Belien et al. (2014) measured stem radius variations of Black Spruce (*Picea mariana*) over 3 years with high-resolution dendrometers along a north–south transect in Quebec, Canada. A summer rainfall exclosure experiment revealed no simple response patterns of stem shrinkage along the studied transect. It became clear that soil properties have to be taken into account for explaining site-specific differences in long-term tree behaviour. Applying multivariate statistics on a network of 41 oak (*Quercus robur*, *Q. petraea*) chronologies extending over south-eastern Europe, Cufar et al. (2014) identify regional climate-growth response patterns and are able to relate differences in seasonal forcing of precipitation on growth dynamics to areas with specific climate characteristics.

The studies of Hetzer et al. (2014) and Ruiz Diaz Britez et al. (2014) have a closer look at wood density as an important trait of conifer wood regarding the potential to adapt to drought stress. Hetzer et al. (2014) study variations in the latewood of Corsican pines (*Pinus nigra* ssp. *laricio*) in the mountain Mediterranean climate on Corsica on the cellular level. Based on quantitative analyses of digital photographs of smoothed wood surface samples, they relate macroscopically detectable variations in wood density to variations of cell parameters along profiles through the latewood part of the tree ring. In individual years with intra-annual density fluctuations (IADFs), the course of cell parameters and wood density deviate from the long-term mean, and so do the triggering climate conditions. Ruiz Diaz Britez et al. (2014) relate wood density properties in exotic Douglas fir (*Pseudotsuga menziesii*) planted along a humidity gradient in plantation forests in France to drought sensitivity and tree mortality. Their study indicates a clear relationship between higher and temporarily more variable wood density characteristics and higher fitness and adaptability to drought in Douglas fir, thus linking the wood structural properties to the practical issues of increasing the resilience of forest ecosystems to possible more extreme climates in the future by forest management strategies.

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A. Bräuning (✉)
Erlangen, Germany
e-mail: achim.braeuning@fau.de

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