

Editorial

Wood Structure in Plant Biology and Ecology

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This Thematic Issue of *The Open Forest Science Journal* is dedicated to the researches presented at the International Symposium "Wood Structure in Plant Biology and Ecology - WSE", held in Naples (Italy) on 17-20 April 2013. The Symposium was organised by the Department of Agricultural and Food Sciences of the University of Naples Federico II and the Department of Environmental, Biological and Pharmaceutical Sciences and Technologies of the Second University of Naples, on behalf of the Afro-European Group of the International Association of Wood Anatomists (IAWA) and of the Association of Tree-ring Research (ATR). It was a follow-up of the II Meeting of the Cost-Action "STREESS - Studying Tree Responses to extreme Events: a SynthesiS" that was held on 15-16 April 2013.

The study of wood structure integrated in Plant Biology and Ecology is essential to reach a comprehensive understanding of woody plant growth and forest dynamics. This ambitious objective requires strict cooperation between experts working on different aspects of wood: xylogenesis and cambial phenology, phylogenesis and ecological wood anatomy, ecophysiology and dendro-ecology, plants' responses to climate change and tree-growth modelling.

Wood represents the best-dated archive of climate and environmental information: anatomical and chemical signals are a synthesis of the various environmental factors and interconnected processes occurring during tree growth. The timing of wood formation and the features of formed xylem cells are influenced by the action of environmental factors, including temperature, length of the growing season and water availability. Nevertheless, the relationships between tree-ring features and climatic stress experienced by plants in the past are not straightforward. Moreover, the different aspects of single plant growth performance, including cell proliferation and plant water-relations, are often not thoroughly analysed in the framework of forest growth and dynamics.

The programme of the WSE Symposium had the merit to present a wide spectrum of various aspects of wood structure

in plant biology and ecology, starting from sub-cellular mechanisms of wood formation up to the response of forest growth to climate variations. It was organised into different sessions preceded by a plenary session debating the impact of global change on tree-rings and xylem physiology. One of the sessions was dedicated to ecological and evolutionary wood anatomy, aiming to present phenotypic modifications of wood structure as a response to one or more changing ecological factors in an evolutionary framework. The second session was devoted to xylogenesis, considering constraints during wood formation due to both genomic-based endogenous regulation and environmental pressure. The other sessions were more directed to understand the relations between tree-growth and environmental variability through methods of dendro-ecology and plant eco-physiology. Indeed, such relations are a key aspect concerning past climate reconstruction as well as the analysis of current and potential future forest dynamics. General discussions aiming to indicate research gaps and formulate burning questions for future research were fervent.

For this Thematic Issue, we selected mainly extended abstracts about the effects of climatic and environmental factors on tree growth. Devi's research analyses the impact of climatic changes on Siberian spruce growth forms and growth strategies, and highlights that dendrochronological research can be used to help understanding the eco-physiology of plants. Remaining at the tree-line level, Piermattei *et al.* detect possible common pattern of structure and growth dynamics of European black pine regeneration, through the investigation of tree structural attributes and dendrochronological analysis. The analysis of tree rings integrated with modelling tools is presented by Tishin and Chizhikova to evaluate the complex impact of changing climatic factors on radial growth of Scots pine. In the framework of climatic scenarios forecasting increasing drought conditions for the Mediterranean Region, the paper by Fernández-de-Uña presents a case study analysing how enhanced drought conditions affect the cambial phenology and the intra-annual growth of *P. sylvestris* at its local lower elevation limit. The effects of expected increasing drought is also studied by Mazza *et al.* who present a dendroclimatic analysis to assess the climate-growth relationships of *Abies alba* Mill. over the last century in marginal populations of Central Italy. Finally, Papadopoulos shows the potentiality of dendrochronology studies as an helpful tool to reconstruct not only the growth history of trees, but also the impact of

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§The Guest Editors

past management techniques. Altogether these papers furnish examples of dendro-ecological applications to analyse the effect of climatic factors and human impact on tree-rings in plants growing in ecosystems threatened by climate change.

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