



<b>Climate responses of xylem anatomical traits favor the alien black locust over the coexisting native pedunculate oak in a temperate alluvial forest</b>
P. Nola <sup>1</sup> , F. Bracco <sup>1</sup> , S. Assini <sup>1</sup> , G. von Arx <sup>2</sup> , D. Castagneri <sup>2</sup>
<sup>1</sup> <i>Dep. Earth and Environmental Sciences, University of Pavia, Italy</i> <sup>2</sup> <i>Swiss Federal Institute for Forest Snow and Landscape Research WSL CH-8903 Birmensdorf, Switzerland</i>
e-mail for corresponding author: paola.nola@unipv.it
<b>Key words:</b> tree-ring anatomy, vessel, climate response, drought
<p>Forest management strategies require knowledge on how co-occurring native and alien species react to unprecedented climate conditions, which can severely affect xylem conductivity and growth performance. We aimed at quantitatively comparing xylem anatomical traits of co-occurring native <i>Quercus robur</i> L.(QURO) and alien <i>Robinia pseudoacacia</i> L. (ROPS) and assessing similarities and differences in their responses to climate variability. The study site is located in the State “Siro Negri” Natural Forest Reserve, within the Ticino Regional Park, Northern Italy. We analyzed ring width and several vessel parameters at ring and intra-ring level. Mean chronologies (1954-2005) were crossed against monthly temperature and precipitation data for the whole period and along 30-year moving windows. We also assessed responses to extreme conditions in 2003. ROPS produced smaller vessels and modulated its responses to climate variability by adjusting the balance between number and size. Vessel traits of both species were similarly favored by rainy previous summer and mild autumn, while in winter ROPS showed higher sensitivity to water excess. In the growing season ROPS delayed the onset of growth processes compared to QURO. The 2003 summer heatwave strongly affected vessels formed in the following year in QURO, but much less in ROPS.</p> <p>In conclusion, ROPS showed higher ability to cope with both climate inter-annual variations and extreme events compared to QURO. These differences could increase ROPS future competitiveness, slowing down the natural succession and the regression of the pioneer invasive species by the later-stage QURO.</p>