

IMPACTS OF DROUGHT ON TREE GROWTH: A COMPARISON BETWEEN SPECIES GROWING UNDER WATER LIMITED ENVIRONMENTS

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Trees provide a critical ecosystem service as carbon sinks, storing carbon in their xylem structures; however, this role may be compromised by the increasing frequency and severity of droughts. Therefore, elucidate tree growth response to different climate conditions is critical to forecast trees future response. We evaluated how climate constrains tree growth in two Mediterranean conifers, *Pinus pinaster* Ait. and *Juniperus thurifera* L. (dioecious species), growing under contrasting hydrological conditions in Spain. Tree-ring width (RW), intra-annual wood density fluctuations (IADF), minimum and maximum wood density (D_{\min} , D_{\max}) were measured in *P. pinaster* along a 300 km gradient of increasing continentality. RW, IADF, tracheid lumen area and wall thickness were measured in *J. thurifera*, in two localities (dry & humid) considering sex-related differences.

Both species showed differences in the timing of climatic response to each anatomical trait. Moreover, we found strong sex-related differences in *J. thurifera*, suggesting that xylem anatomy was primarily determined by sex. Drought had a great impact on RW, D_{\min} and D_{\max} in *P. pinaster*, increasing with continentality (Arzac et al., *in review*). Nevertheless, the response in *J. thurifera* varies according to the sex (Olano et al., *in review*). Females showed xylem anatomical traits related more to hydraulic efficiency (higher conductivity) than safety (thinner tracheid walls), whereas males followed a more conservative strategy, especially in the drier site (producing widest walls, reducing the conductivity) (Olano et al., *in review*). Interestingly IADF occurrence responded to punctual episodes of high rainfall at different phases of latewood formation in both species. However, the climatic signal in *J. thurifera* varies by sex, being higher in males than in females (Olano et al., 2015).

Although both species responded in different ways, this comparison reveals their ability to grow under contrasting climatic conditions.

References

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