

Water-use strategies in two co-occurring Mediterranean evergreen oaks: surviving the summer drought.

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Abstract: In the Mediterranean evergreen oakwoodlands of southern Portugal, the main tree species are *Quercus ilex* ssp. *rotundifolia* Lam. (holm oak) and *Quercus suber* L. (cork oak). We studied a savannah-type woodland where these species coexist, with the aim of better understanding the mechanisms of tree adaptation to seasonal drought. In both species, seasonal variations in transpiration and predawn leaf water potential showed a maximum in spring followed by a decline through the rainless summer and a recovery with autumn rainfall. Although the observed decrease in predawn leaf water potential in summer indicates soil water depletion, trees maintained transpiration rates above 0.7 mm day⁻¹ during the summer drought. By that time, more than 70% of the transpired water was being taken from groundwater sources. The daily fluctuations in soil water content suggest that some root uptake of groundwater was mediated through the upper soil layers by hydraulic lift. During the dry season, *Q. ilex* maintained higher predawn leaf water potentials, canopy conductances and transpiration rates than *Q. suber*. The higher water status of *Q. ilex* was likely associated with their deeper root systems compared with *Q. suber*. Whole-tree hydraulic conductance and minimum midday leaf water potential were lower in *Q. ilex*, indicating that *Q. ilex* was more tolerant to drought than *Q. suber*. Overall, *Q. ilex* seemed to have more effective drought avoidance and drought tolerance mechanisms than *Q. suber*.