



Pure vs mixed stand of *Quercus ilex* L: how much local site conditions influence drought responses?

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Forest productivity in Mediterranean ecosystems is mainly limited by water availability and can be influenced by intra and inter-specific interactions. The different physiological strategies of stress response and resource use adopted by the various species can be responsible for different growth performances leading to different levels of competition and/or complementarity. Such relations may change along sites and over time, also depending on climatic conditions and tree aging.

In this study, we applied a multidisciplinary approach of dendro-anatomy and stable isotopes ($\delta^{13}\text{C}$ and $\delta^{18}\text{O}$) to compare the productivity and the intrinsic water use efficiency (WUE_i) of *Quercus ilex* growing in pure and in mixed stands of *Pinus pinea* in two study areas of the Vesuvio National Park (Southern Italy), differing for tree age, stand density, slope and soil properties. The local site conditions resulted to influence inter- and intra-species interactions. Indeed, competitive reduction and increase in WUE_i was experienced in the area with more soil water holding capacity, lower stand density and less slope, while competition occurred in the other area linked to a tight stomata control.

Our findings showed the importance of understanding what drives inter- and intra-species interactions under a changing climate when planning management strategies in mixed and pure stands, since one of the priority in forestry is to acquire knowledge on the capability of different forest ecosystems to adapt to short- and long-term climatic variability, especially in climate change hot spots such as the Mediterranean basin where increase in frequency and severity of water shortage is forecasted.