Geophysical Research Abstracts
Vol. 20, EGU2018-15667, 2018
EGU General Assembly 2018


# Fraxinus ornus trees differ in biomass partitioning and not wood anatomy along an aridity gradient

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Future drier summers and milder winters are expected to increase the occurrence of tree mortality events due to carbon starvation and hydraulic failure. Trees experiencing droughts may either succumb and therefore die, or develop adaptation/acclimation strategies to survive. Although these strategies are still not completely understood, there are emerging evidence that they involve the coordination of water and carbon ecomomies.
We collected trees of the widespread Fraxinus ornus species growing at five sites with different soil water availability in the North of Italy. We measured the dry biomass of leaf, stem and branches. Furthermore, we explored the axial trends of xylem and phloem anatomical traits along the stem.
In the drier sites, we found a higher amount of leaf mass for a given amount of stem and branch mass. At the anatomy level, all trees irrespective of site converged to the same isometric relationship between xylem and phloem areas and to the same axial scaling of hydraulically-weighted mean vessel diameter (Dh) with distance from the apex (L). Instead, soil moisture affected the phloem structure, with the trees growing in the drier sites producing wider phloem cells, especially at the stem apex.
Our results suggest that Fraxinus ornus trees prioritise allocation to photosynthetic (leaves) over transport (xylem) tissues under drought, to maintain a sustainable balance between carbon assimilation and consumption for maintenance and biomass production, and between transpiration and water transport. The observed higher leaf to sapwood mass ratio combined with the lack of adjustments in leaf specific conductance, indicate that trees in drier environments do not invest more into water transport and xylem safety, and are likely even more exposed to the risk of embolism formation.