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## Morphological and physiological acclimation of *Quercus coccifera* L. seedlings to water availability and growing medium

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**Abstract** One of the main constraints of reforestation in the Mediterranean region is low summer water availability during the first years after out planting. Plant water availability depends on the precipitation regime, but also on the physical properties of the soil. Higher survival rates result when seedlings are soil acclimated. Our main goal was to describe the morpho-physiological responses of 6-, 10- and 18-month-old *Quercus coccifera* seedlings growing in a natural soil (terra rossa) or a standard nursery growing medium, and to assess in the nursery if seedlings growing in natural soil were more resistant to deficit irrigation. The high growth rate achieved after 10–18 months by terra rossa-grown seedlings in contrast with those grown in the nursery substrate suggests that the former were acclimated to the soil. Higher photosynthetic rate (A), transpiration (E) and stomatal conductance ( $g_s$ ) were observed in terra rossa seedlings, mainly during the first months. The higher carbon availability may account for the higher root nitrogen concentration in terra rossa-grown seedlings, which could favor their later field growth. Low-watered seedlings showed a certain degree of hardening, since after 18 months, they showed higher A, E,  $g_s$  and lower photoinhibition than well-watered seedlings, likely attributable to the sharp leaf-to-root biomass ratio reduction. Carbon isotope discrimination ( $\Delta$ ) values were similar to those of well-watered plants and indicated a non-stomatal component as the main factor controlling photosynthesis in these leaves. Eighteen-month-old low irrigated seedlings had the highest mortality. Overall, results suggest that nursery terra rossa-acclimated *Q. coccifera* seedlings with improved physiological status and hydraulic soil-root continuity would have a higher survival rate in the field.

**Keywords** Drought stress · Seedling quality · Soil acclimation · Soil mechanical impedance · Soil texture · Soil volumetric water content

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