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REGULAR ARTICLE

Using hydrogel and clay to improve the water status of seedlings for dryland restoration

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Abstract In dryland ecosystems, post-transplant water stress produces high seedling mortality after the first summer following outplanting. Our aim was to assess the effects of clay and hydrogel, both on the water holding capacity of the growing media and on various morphological and physiological characteristics of *Quercus suber* seedlings in the nursery and, subsequently, during the first 2 years in the field. *Quercus suber* L. seedlings were grown in four types of growing media: CS (Control growing media, standard mixture of limed peat and coconut peat, 1:1 v/v ratio), SC-10 (CS mixed with sepiolite clay at 10% v/v) and HS (CS mixed with hydrogel Stockosorb® K-400 at two doses, 0.7 and 1.5% w/w). HS-1.5 showed the best results, increasing the water holding capacity of the root plug, improving seedling water status and increasing seedling survival in the field. SC-10 showed an intermediate effect on seedling response in the field. Mixing hydrogel with a peat-based growing medium to form root plugs is a suitable technique for cultivating species to be planted in areas with a strong water deficit. This technique reduces post-transplant water stress in seedlings during their first months in the field and contributes to improve forest-restoration methods in dryland ecosystems.

Keywords *Quercus suber* · Plant stock quality · Substrate · Water availability · Carbon isotope composition

Abbreviations

CS	Control growing media
SC-10	CS growing media mixed with sepiolite clay at 10% v/v
HS-0.7	CS growing media mixed with hydrogel at 0.7 w/w
HS-1.5	CS growing media mixed with hydrogel at 1.5% w/w
H_S	Shoot height
RCD	Root collar diameter
SI	Slenderness index
DW_S	Shoot dry weight
DW_R	Root dry weight
DW_R/DW_S	Root/shoot ratio
SDW	Seedling dry weight
DW_R/SDW	Root dry weight/seedling dry weight ratio

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