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## The effect of biochar amendment on the growth, morphology and physiology of *Quercus castaneifolia* seedlings under water-deficit stress

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关键词	<a href="#">Biomass</a> ; <a href="#">Chestnut-leaved oak</a> ; <a href="#">Water deficit</a> ; <a href="#">Photosynthesis</a> ; <a href="#">Xylem water potential</a> ;
摘要	Water stress is one of the most important environmental stresses which can adversely affect soil fertility and plant growth in arid and semiarid regions. In this study, biochar was used as a type of soil amendment to improve the physiology of Chestnut-leaved oak ( <i>Quercus castaneifolia</i> C.A.M.) seedlings and soil quality in water-deficit conditions. A randomized complete block design was conducted using three water regime treatments [100, 70 and 40% field capacity (FC)] and four application rates of produced biochar from hornbeam wood chips (control without biochar, B1, B2 and B3 with 10, 20 and 30 g kg <sup>-1</sup> soil, respectively) in potted seedlings. The soil water-holding capacity in the 30 g kg <sup>-1</sup> biochar was found to be higher than that in the non-biochar treatment under 100 and 40% FC. Water supply reduction to 40% FC decreased the soil total N, the available P and K, CEC, SOC and microbial respiration, as compared to the non-biochar soil used as the control; however, an increase in the B3 treatment was detected in the soil P and K at 100% FC. Severe water deficit (40% FC) induced a significant decrease in photosynthesis, transpiration, stomatal conductance and xylem water potential seedlings; even, in this case, the addition of the highest dose of biochar under the lowest water supply increased photosynthesis and stomatal conductance by 38% and 39%, respectively. Leaf nutrient concentration was also influenced by the treatment. The highest diameter and height growth and dry weight of the seedlings were observed in 100 and 40% FC under the B3 treatment. Plant biomass of the seedlings treated by B3 was increased by 55, 70 and 73%, in comparison with those attained by the control under 100, 70 and 40% FC irrigation, respectively. Generally, the use of the 30 g kg <sup>-1</sup> biochar in the soil could alleviate the negative effects of water deficit and improve the growth of <i>Q. castaneifolia</i> seedling and soil quality with increasing the soil water-holding capacity, organic carbon and nutrient.
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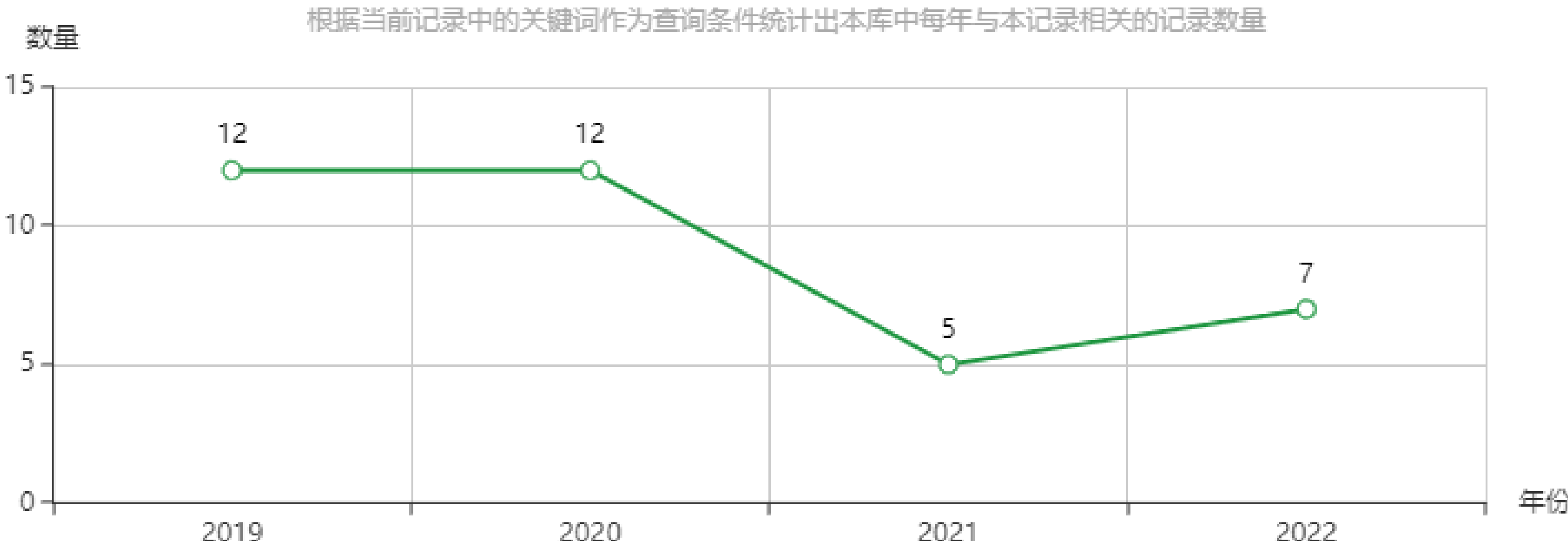
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