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Drought-induced photosynthetic inhibition and autumn recovery in two Mediterranean oak species (*Quercus ilex* and *Quercus suber*).

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Abstract: Responses of leaf water relations and photosynthesis to summer drought and autumn rewetting were studied in two evergreen Mediterranean oak species, *Quercus ilex spp. rotundifolia* and *Quercus suber*. The predawn leaf water potential (ΨlPD), stomatal conductance (gs) and photosynthetic rate (A) at ambient conditions were measured seasonally over a 3-year period. We also measured the photosynthetic response to light and to intercellular CO2 (A/PPFD and A/ Ci response curves) under water stress (summer) and after recovery due to autumn rainfall. Photosynthetic parameters, Vcmax, Jmax and triose phosphate utilization (TPU) rate, were estimated using the Farquhar model. RuBisCo activity, leaf chlorophyll, leaf nitrogen concentration and leaf carbohydrate concentration were also measured. All measurements were performed in the spring leaves of the current year. In both species, the predawn leaf water potential, stomatal conductance and photosynthetic rate peaked in spring, progressively declined throughout the summer and recovered upon autumn rainfall. During the drought period, *Q. ilex* maintained a higher predawn leaf water potential and stomatal conductance than *Q. suber*. During this period, we found that photosynthesis was not only limited by stomatal closure, but was also downregulated as a consequence of a decrease in the maximum carboxylation rate (Vcmax) and the light-saturated rate of photosynthetic electron transport (Jmax) in both species. The Vcmax and Jmax increased after the first autumnal rains and this increase was related to RuBisCo activity, leaf nitrogen concentration and chlorophyll concentration. In addition, an increase in the TPU rate and in soluble leaf sugar concentration was observed in this period. The results obtained indicate a high resilience of the photosynthetic apparatus to summer drought as well as good recovery in the following autumn rains of these evergreen oak species.