

# **Effects of increasing drought and forest management on the growth of mixed forests of *Quercus ilex* and *Quercus cerrioides* during regeneration after fire**

**Miriam Cotillas<sup>1</sup>, Joseph Mº Espelta<sup>1</sup>, Santi Sabaté<sup>1, 2</sup>**

## **Abstract**

The NE Spain has been specially threatened by several great wildfires in the last decade (e.g. 100.000 ha in Catalonia from 1994 to 1998). These disturbances had important consequences for the forest structure and composition. Large masses of *P.nigra* forests were completely destroyed by fire with no natural regeneration at all. Instead, the current landscape is dominated by *Q.ilex* and *Q.cerrioides* mixed forests regenerated by resprouting. The resulting structure is a coppice characterised by high-density stands of multi-stemmed stools with relatively small resprouts, slow vertical growth and low production rates. To manage these forests and encourage their regeneration, an alternative appears to be their gradual conversion into stored coppices (i.e. coppices in which there remains only one or two stems per stool), through the selection and elimination of the weakest resprouts. This process could increase the availability of resources, such as water and nutrients, for the remaining stems through reducing competition among the reserved stools.

Furthermore, according to the IPCC (2001), global warming can result in an important decrease in rainfall in the Iberian Peninsula. This fact, combined with an expected warmer climate, could increase the water deficit in Mediterranean ecosystems, affecting their productivity, their continuity and their resilience after disturbances, such as wildfires. Thinning has been argued to increase stem growth but, although the response of some Mediterranean oaks to thinning has been thoroughly documented, there is a lack of information about to what extent this practice may mitigate the effects of increased drought.

In this study, we explore the effect of increasing drought on growth for two common co-occurring Mediterranean oak species in mixed extensive coppices after large wildfires, and the potential effects of thinning to reduce drought consequences..

The experiment started in 2004, in a mixed coppice of *Q.ilex* and *Q.cerrioides* resprouted after a wildfire (1998). Following a factorial design, the sampling area was subdivided into 12 plots (20m x20m), where thinning and increasing drought were factorially combined in four treatments. Rain exclusion was set by drainage channels covering 15% of ground surface in the selected plots, which resulted in a mean annual decrease in soil water availability of about 10%. Decrease in water availability showed a high variability between years and seasons, being more important during spring, when the decrease in soil moisture reaches 13% in plots with increasing drought treatment. Preliminary results show: i) an important effect of thinning in stem growth, both in height and diameter, ii) a reduction in tree growth mediated by drought and iii) a positive effect of management for growth in the plots where drought was induced. Both factors (management and increasing drought) show different effects in *Quercus ilex* and *Quercus cerrioides*, which suggest that drought may have different consequences for evergreen and deciduous species in the post-fire regeneration of mixed forests.

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<sup>1</sup> CREAF (Center for Ecological Research and Forestry Applications), Autonomous University of Barcelona. E-08193 Bellaterra. [miriam@creaf.uab.es](mailto:miriam@creaf.uab.es)

<sup>2</sup> Departament of Ecology, University of Barcelona. Av. Diagonal 645. E-08028 Barcelona.