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Comparative analysis of recovery after experimental fire in three shrub ecosystems along a climatic gradient

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ABSTRACT: The aim of this study is to compare the recovery dynamic in three shrub ecosystems submitted to experimental fire and situated on an altitude gradient. Climatic features are different in each area, but all of them had the common characteristic of being very homogeneous before burning, with only one shrub species clearly dominant (different in each area). The first area was a heathland dominated by *Calluna vulgaris*, situated at an altitude of 1600 m, with a continental climate (mean annual precipitation 1320 mm). The second area was a heathland dominated by *Erica australis,* located at an altitude of 1000 m (mean annual precipitation 840 mm). The third area was a *Cistus ladanifer* shrubland, located at 900 m altitude, with a Mediterranean climate like the previous area, but with lower mean annual precipitation (470 mm). *Erica australis* recovers after fire by vegetative resprouting, but *Cistus ladanifer* is an obligate seeder as is *Calluna vulgaris* in these areas. The burning was carried out in summer simulating a wildfire on a surface of 100 m^2 in each area. Recovery is faster in *Cistus ladanifer*: two years after fire its cover value was 40% *versus* less than 20% in the other two species. There was high mortality in *Calluna vulgaris* in the 3rd and 4th year and then recovery was very slow, with only a mean cover of 20% ten years after fire *versus* 70% for *Cistus ladanifer* and 50% for *Erica australis*. The recovery of dominant shrub species determined the cover and richness of herbaceous species. This induced a different community dynamic in each area with the lowest diversity values in the *Cistus* community, except during the first years, the highest cover values of herbaceous species in the *Calluna* plot and the highest number of herbaceous species in the *Erica* plot.

1 INTRODUCTION

Shrub communities are very abundant in Spain, covering 33% of León province (Ministerio de Agricultura, 1984). Most of them are a result of human activity and usually very resilient to disturbances and recover by an autosuccession process (Luis et al., 2000). Fire is one of the common management methods used by shepherds to reduce the proliferation of woody species and maintain pasturage, both in the mountains (higher than 1500 m above sea level) and on the plains (800-1000 m). Most of the shrub species in these communities recover by vegetative resprout, but others, like Cistus species, are considered obligate seeders, with seeds whose germination is stimulated by heat (Valbuena et al., 1992; Trabaud, 2000)

The aim of this study is to compare the recovery dynamic in three shrub ecosystems submitted to experimental fire and situated on an altitude gradient (900 – 1600 m). Climatic features are dif-