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Burn severity and plant regenerative traits modulate vegetation response in different fire-prone Mediterranean ecosystems of the Iberian Peninsula

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Abstract

Fire is an important ecological element in the Mediterranean Basin. However, increases in fire frequency, burned area and burn severity may have relevant implications for these ecosystems. In fact, burn severity is one of the most significant factors affecting plant communities, since it has important effects on post-fire vegetation recovery. In addition, climatic conditions also influence the response of vegetation, mainly because of their effects in the productivity of the community. Thus, fire regimes have influenced the regeneration mechanisms of many plant species in Mediterranean ecosystems, which present regenerative traits that allow them to persist after fire. Therefore, the biological potential of plants is relevant to evaluate the damage cause by fire in these ecosystems. To evaluate burn severity effects on vegetation regeneration regarding of different plant regenerative traits, we focused on two wildfires occurred in 2017 in different areas of de Iberian Peninsula: the Cabrera wildfire (NW Spain), which burned 9939 ha of ecosystems dominated by *Genista hystrix* Lange, *Erica australis* L., *Cytisus scoparius* (L.) Link, and *Quercus pyrenaica* Willd,; and the Gátova wildfire (SE Spain), which affected 1414 ha of *Pinus halepensis* Mill. forests. We randomly fixed a total of 384 and 80 field plots (2 m x 2 m) in Cabrera and Gátova, respectively, covering fire perimeters and unburned areas. After this, burn severity was evaluated at every burned plot by the application of the CBI index (Composite Burn Index). One year after the wildfires, the percentage cover of each woody species was evaluated at each plot. To analyse vegetation changes over time, burned plots were also sampled two years after fire. We classified the species according to the following regenerative traits: reproductive strategy (resprouter, obligate seeder or facultative), bud bank location (aboveground and belowground) and heat-stimulated germination (yes or no). According to the main results, vegetation cover in Cabrera tended to increase under high severity situations with respect to low and moderate severities. However, resprouters and obligate seeders with heat-stimulated germination responded better to burn severity. In Gátova, vegetation recovery showed greater variation among plant traits. In this area, facultatives and heat-stimulated species regenerated better at high severities, but the cover of the dominant vegetation decreased with burn severity. In general, we observed an increment in cover

values over time in both areas, but better climatic conditions could have favored regeneration in the Cabrera study site with respect to Gátova.

Keywords: Burn severity, regeneration, reproductive strategy, wildfire

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