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# Plant diversity and functioning of a Mediterranean shrubland under drier conditions

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## Abstract

In the global change context, the biodiversity in the Mediterranean basin is expected to be particularly threatened and the drought periods -already stressful for plants- are predicted to be more frequent, intense and longer in this region. Consequently, notable changes in ecosystems functioning are predictable. The biodiversity-ecosystem functioning relationship is well documented, likewise the effects of aridity on vegetation. Nevertheless, shrubland ecosystems still understudied and experimental studies considering shrublands performances and biodiversity shifts under increased drought are rare. We conducted a rainfall reduction experiment in a 2-ha Mediterranean shrubland (Southeastern France) to link rainfall decrease and biodiversity changes across multiple trophic levels, and their feedbacks on ecosystem functioning. After two years, we found that the effect of increased drought on shrub performances (production, mortality, litterfall) was species-dependent; moreover the effect on a particular species could be modulated by the diversity of the co-dominant species. Higher diversity reduced the impact of increased drought on community performances. The total vascular plant diversity depended on the specific combination and relative abundance of dominant shrubs. At short-term the increased drought alone had no direct effect on shrubland diversity. Nevertheless, the observed trends could result in the mid term in an indirect effect of rainfall decrease on ecosystem diversity and functioning via the direct effect on dominant shrubs. Our results reveal the importance of nowadays plant diversity on future functioning of Mediterranean shrublands under drier conditions, and the importance of taking into account biotic factors in predicting ecosystem functioning under climatic changes

**Keywords:** Mediterranean shrubland, climate change, biodiversity, ecosystem functioning, rainfall exclusion

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