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Interactive comment on "Experimental drought induces short-term changes in soil functionality and microbial community structure after fire in a Mediterranean shrubland" *by* M. B. Hinojosa et al.

M. B. Hinojosa et al.

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RESPONSE TO ANONYMOUS REFEREE #2

We acknowledge the constructive comments to strengthen the presentation and discussion of our results. Please find the answer to the referee #2 comments bellow.

REFEREE #2 COMMENT 1 (RC1): The paper's overall objective is to investigate how drought affects post-fire responses in soil. The application of treatments, responses measured, field and lab approaches are sound. However, in my view, the experimental design is not being used appropriately to address the question. A factorial design to explore main and interactive effects of fire and drought would be ideal to investigate the

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question (this would imply a much larger experiment, particularly if levels of drought are to be explored). However, the design actually used by the authors could work as an alternative approach and valuable insights could be derived. As currently presented, the authors show results and discussion as if two different and separate questions are asked, and their interplay comes almost anecdotally: 1. what's the effect of fire? (using not droughted with and without fire plots) 2. what's the effect of drought? (using burned plots under different types of water manipulations) Because of this structure, the hypotheses, results and discussion are messy and don't actually meet the goal of answering the original question. However, the current design allows for a more explicit comparison of the effect of fire on not droughted plots vs the effect of fire on droughted plots. This would allow to make hypotheses and conclusions in terms of (a) whether drought reinforces or counteracts or doesn't affect the impact of fire and (b) whether this is time dependent. To do this, I'd suggest, to instead examine responses to fire, as differences or ratios. That is, ec+/ec-, hc+/ec-, md+/ec-, sd+/ec-. Because all plots are randomized and are all in one same area this should be legitimate. In this way, while the raw observations can be presented in tables, the ratios (or differences) will just be one set. In this way, the introduction could be re-written and better focused to frame more specific hypotheses about how drought modifies the response to fire, i.e. does it counteract or exacerbate the response. I see that at the end of the discussion some of the conclusions point in this direction, but as I tried to convey before it is messy in its current state.

ANSWER TO COMMENT 1 (AC1): We appreciate this comment. We want to recall the explanation provided to the general comment 1 of reviewer #1 (AGC1). In regard to the use of ratios (or differences) to directly calculate the effects of fire and the additional effects of drought, we believe this would rest on assumptions that may or may not be met. One problem with this is that the EC- treatment cannot carry the effects of rainfall manipulation implemented before burning in the other drought treated plot (i.e. HC, MD and SD). If we did as suggested, we would have to accept that such manipulations did not have an effect before fire, but there is no basis for that. In addition, if we could

accept such an assumption, the approach proposed by the reviewer #2 is based on an additional assumption, which is that both factors (fire and drought) are additive, i.e. there are not interactions among them (Quinn and Keough, 2002), which, again, is not warranted. Since our objective was focus on the effect of an extreme situation of drought, which could have carry-over effects into the post-fire environment, we had to make choices given the limitations we had. Do keep in mind that, in the end, one cannot address all aspects of fire in one experiment. The comparison of fire alone was simply an opportunity to have a reference of fire effects under one set of conditions. It provides a reference, but one has to be cautious to not use it beyond what it means.

RC2: Once more specific hypotheses are put forward, regarding selected variables of interest, some exploration of particular mechanisms could be explored using relationships among response variables, that is going a little beyond just listing the responses of every single variable measured.

AC2: This comment is much appreciated. We had explored some of this, but decided to keep the paper succinct. The revised version will include some of the most relevant.

RC3: Specific comments: I consider important to state the dates of sampling in and the dates of watering.

AC3: The dates of sampling will be specified in the revised version of the paper. For the dates on rainfall and/or irrigation, we will include a figure showing the accumulated water fallen each biweekly period for each experimental treatment, since it was the way the experiment was designed (Parra et al. 2012). During the experiment, natural rainfall was allowed until reaching the specified target for each fortnight, after which rainfall was excluded. If natural rainfall was lower than established during the fortnight, the plots were irrigated until reaching the target specified for that period.

RC4: Also, the x-axis representing time should be a continuous variable.

AC4: We will change the x-axis representing time as a continuous variable for greater

clarity.

RC5: The results need to be considerably synthesized, focused and shortened.

AC5: The revised version will be shortened and, where feasible, reworded for greater clarity and focus.

RC6: The discussion would need to be re-structured in full.

AC6: The authors will make an effort to make the discussion more concise and clear. In addition, we will try to give more importance to the relationships among response variables in the discussion.

RC7: There are too many tables and figures. The results of the statistics presented in tables could be integrated into the figures.

AC7: We will integrated as many test as feasible within the figures or else take some of them to Appendices

RC8: Table 2: are these fractions?

AC8: Yes, the data presented in Table 2 are fractions representing the relative abundance of fatty acid groups.

REFERENCES Parra, A., Ramírez, D. A., Resco, V., Velasco, Á., Moreno, J. M. (2012). Modifying rainfall patterns in a Mediterranean shrubland: system design, plant responses, and experimental burning. International journal of biometeorology, 56, 1033-1043.

Quinn, G.P., Keough, M.J. (2002). Experimental design and data analysis for biologists. Cambridge University Press. 537pp

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