

Interactive comment on “Disturbances of Biological Soil Crust by fossorial birds increase plant diversity in a Peruvian desert” by María Cristina Rengifo and Cesar Arana

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We thank gratefully the comments given, which we found constructive and improved tremendously the quality of this manuscript. We agree with most of the comments. We have revised the manuscript in the light of the comments. Below the separated specific comments we indicate our responses and we attached a new version of the manuscript in the supplement.

Comments by D. Eldrigge

This manuscript describes a study of the impacts of disturbance of biological soil crusts

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on soil chemical properties and soil seed banks in a hyper-arid environment in Peru. This is an interesting topic, that has rarely been discussed in the literature. The research outlined in this paper is certainly worthy of publication in Biosciences, but in my opinion, the manuscript in its current state is not ready for peer review. It needs more conceptualisation in the introduction and more thought regarding the structure and experimental design, as well as a dedicated statistical section before I could assess the veracity of the results.

Specific comments

Firstly, the introduction is not very well developed and should comprise about four paragraphs. The first should identify the broader framework or a conceptual question or problem within this literature, then transition in a general sense into how your study might provide some answers. The second should define and introduce only the most important features of the study system or organism. In the third paragraph you should introduce your study system and explain the key features and why it is ideal for studying this question. The fourth should outline broad hypothesis and a handful of more specific hypotheses or questions, why the work is novel or important.

RE: We restructure the Introduction to meet all the points given.

The methods section need substantially more work and are quite confusing. You need to say somewhere that you had three surfaces. 1: undisturbed biocrust; 2: biocrust disturbed by birds (hereafter the disturbed); 3: artificially disturbed plots (hereafter human disturbed) and then what these disturbances look the disturbed area of mound or a depression?

RE: We add a section to described the biopedturbations in the Introduction and stated the different surfaces analyzed in each method section

It is unclear how the 26 plots are distributed among the four treatments. Does one site consist of the four treatments? This setup is very confusing to the reader needs more

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explanation and perhaps a figure. Also, it is unclear what happens at day 60. How do you sample undisturbed crust at day 60. If you have already removed it?

RE: We add a paragraph in the Introduction as a first description of the biopedturbations studied and further description in the third paragraph of the 2.1 Method section. To help visualize the description of the experimental design of the moisture sampling we add a picture (Fig 3). To simplify the data analysis and meet our objectives, we also shortened the soil moisture content analysis, and only used the data taken at day 60. Also, we were able to sample undisturbed crust three times in the same plot because the 100 gr soil sample only represent a small area and volume of the total 30x30 plot, and at the second and third time we sampled in the sample plot but not in the exact same point in the plot.

It seems that if you are using mounds as your measure of soil disturbance, then you are essentially measuring subsoil. So if the bird digs beneath a piece of intact Biocrust, then it should be exactly the same as your existing Biocrust, except that it will be older and have a greater chance of being (mound) or gaining resources (pit). Overall, the sampling units need more in-depth discussion in the introduction to describe what you expect in nature relative to different units and why you expected it. Otherwise, it's very hard for the reader to see where the manuscript is heading.

RE: Done. We add a better description of the biopedturbations in the introduction, as well as addressing it better trough the discussion.

Section 2.2: why paired both active and in active with two paired control samples? Why not just look at three treatments (active, inactive and biocrust) and compare them with an over all, any modelling to look for significant differences? What exactly is an inactive disturbance? I would be inclined to describe the activity or process of animal disturbance as biopedturbation then refer to the structures as disturbances

RE: In order to diminish the environmental heterogeneity given by series of factors that we cannot control, we used paired both active and inactive biopedturbations with

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their own control samples, since its very unlikely to find an active bioped really close to an inactive biopedturbation and be able to replicate this. At the same time, the nonparametric paired analysis is a more strong a robust statistical tool considering the design and the low sample size.

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Please also note the supplement to this comment:

<https://www.biogeosciences-discuss.net/bg-2017-376/bg-2017-376-AC1-supplement.pdf>

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2017-376>, 2017.

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