

# ***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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Received and published: 16 October 2017

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

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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.

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?. 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 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?

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.

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 in active disturbance?

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I would be inclined to describe the activity or process of animal disturbance as bioperturbation then refer to the structures as disturbances.

**BGD**

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

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