

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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The MS describes the effect of biopedoturbation on species diversity and plant germination in the Peruvian Desert. By disturbing the surface, fossorial birds create micro habitats that affect plant diversity and density. The increased diversity with increased heterogeneity is rather expected and the current MS adds additional information to a relatively large bulk of literature that exists on this topic. Nevertheless data from the Peruvian Desert is an important contribution. However, unfortunately, the MS is premature. While the authors describe the changes in seed bank and species diversity, no satisfactory explanation for this phenomenon is provided. This is a major obstacle once

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publication in a leading journal is sought. The MS suffers from additional drawbacks (lack of data, unclear Methodology), while the structure, flow and choice of citations also need major improvements.

Main points 1. The topic presented is not new and adds to many other publications on biopedoturbation, as thoroughly summarized by Whitford and Kay (1999). Whereas the authors try to link the findings to the presence of biological soil crusts (BSCs), the data presented are fragmentary and not convincing. The authors suggest that higher moisture availability at the mounds and lack of runoff there may explain the higher diversity and biomass at the mounds. Yet, the authors (1) present only three dates with moisture data throughout the entire growing period (2) the authors assume a linear increase in moisture from day 5 to day 60 (Fig. 2) although intensive fluctuation in moisture is expected due to the erratic nature of precipitation in deserts (3) no rain data are provided, which does not allow for a proper evaluation of the data (4) the values used for the moisture are not clear (gravimetric? volumetric? ratio of WHC?). 2. The data should include a detailed account of the research site (general description of the geomorphology and/or dunes; the particle size distribution, i.e., the amount of sand, silt and clay; the main microorganisms within the BSC and possible their chlorophyll content in mg/m² as well as plant cover) and description of the disturbance (are the three birds mentioned have the same disturbance? What is the size of the mounds?). It should be accompanied by photographs that show the research site with the BSCs, the mounds created by the birds and photographs from the experimental design. Long-term precipitation at the site, including the possible contribution of fog and dew (approximate precipitation) should be added. In addition, clear hypotheses should be outlined and the rationale for measuring each of the variables should be thoroughly explained (for instance, what is the rationale of the chemical analysis of the crust? of measuring the calcium carbonate or EC?). The Methodology should be thoroughly explained (statistics included). For instance, how do the authors define and differentiate between active and inactive mounds? Also, the methods or devices used for measuring each variable should be indicated, as well as the nutrient species. For instance: did the au-

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thors examine total or available P? 3. The Ms structure. Generally, the flow should be substantially improved. In essence the MS lacks Introduction. The Introduction should include general theories regarding the effects of disturbances on the ecosystem, with a specific emphasis on deserts and BSCs, especially on sand-covered BSCs. The Discussion should focus on the findings, discussing the similarities/differences with previous publications and the implications for the ecosystem. For instance, it is generally assumed that water availability at the mounds is lower (Moorhead et al., 1985), in contrast to the authors' conclusion. This should be thoroughly discussed. Also, the analysis is not clear. For instance, there are two main variables that may negatively affect moisture: loss of water due to runoff or increased evaporation. Both possibilities should be discussed. 4. The choice of references is unclear. The link between the mentioned topic and the references should be improved. Reports and abstracts should be avoided unless no other material exists. Book chapters and review papers should at best accompany peer review journal articles with empirical data (rather than being used as central references). Grouping together many topics (6th and 7th line in the Introduction) cannot guide the reader. Citations that refer to trivial points should be eliminated. 5. Many of statements do not reflect the state-of-the-art knowledge and the picture that emerges is rather simplistic. For instance, do crusts necessarily promote plant survival (section 1 of Introduction)? Are BSCs necessarily hydrophobic (upper p. 6)? Will buried crust 'stop' infiltration (upper p. 6)? Do BSCs loose their water following the consumption of water by the microorganisms?

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