

General comments:

1. Additions are needed to the discussion of experimental design and assumptions, water limitation, theoretical dilutions, and implications of the results.

Response: The discussion of experimental design and assumption and implications of the results has been added in Page 23 Line 17-22 and Page 24 Line 1-8. We has also added data of soil moisture and water holding capacity and discussed their potential roles in affecting soil microbial biomass and activity (Page 13 Line XX, Page 20 Line 20-22, Page 21 Line 1-2, and Page 24 Line 1-3). We recalculated (Page 11 Line 4-8; Page 14 Line 17-22) and discussed (Page 15 Line 20) the theoretical values by considering C and N contents in the river sand.

2. The methods should be shortened by omitting details where a reference is cited for a technique, and the results could be shortened by highlighting interesting results and their implications rather than describing every test done on every treatment.

Response: The methods have been shortened by omitting details where a reference is cited for a technique (Page 9 and Page 16, Page 10 Line 11-16). The results have also shortened by only highlighting interesting results, deleting unimportant numbers and just keeping data of 0-10 cm soil (as also suggested by reviewer #1).

3. A thorough editing for English grammar and usage is needed.

Response: We have did a thorough editing for English grammar and hope it reads better now.

Specific comments:

The authors should justify why an experimental approach is needed to better understand the impacts of desertification and why their design is a realistic representation of soil change observed in natural setting. What are the limitations of existing natural gradient or long-term monitoring studies? Do the amendments made represent the range of variability observed in desertified site? Is it realistic to transplant vegetation of the same composition as a native community to the treated sites, as vegetation would change along with the soil in a naturally desertifying site?

Response: We have justified the need of an experimental approach in Page 6 Line

9-14 and Page 18 Line 11-17. The limitations of existing natural gradient or long-term monitoring studies have been discussed in Page 6 Line 9-14. The amendments were actually showed higher range of variability for parameters of soil particle size distribution and SOC contents as compared to other studies based on natural desertification gradient (Zhao et al., 2006, doi:10.1016/j.still.2005.03.009; Zhou et al., 2008, doi:10.1016/j.geoderma.2008.04.003). For transplanting vegetation of the same composition as a native community, we aimed to keep initial plant community the same among soil coarseness gradients. In this way, we could monitor the change of plant productivity and community composition at the start of the experiment which can be attributed to the influence from the factor of soil coarseness.

The experiment was conducted at an arid (450 mm MAP) site, but there is no discussion of water limitation of soil processes or even the precipitation patterns observed during the study. The results of the study could have been very different if it had been conducted during a relatively dry or relatively wet period. Soil moisture data would be ideal, but a simple soil water balance model might help to form a discussion of these issues and the differences between treatments in water holding capacity. It is entirely possible that nutrient limitation is rare in those soils and difference in microbial and enzymatic activity between soil coarseness levels is driven by soil moisture differences. Additionally, it could be useful to provide data, if available, on how soils outside the treatment area changed during the study as this reflect the climate during the period.

Response: Thanks so much for the reviewer's observation. We agree that soil moisture is an essential parameter in this water-limited ecosystem. Thus, we have added the data of precipitation patterns (Fig. 2a), soil moisture (Fig. 2b) and water holding capacity (Fig. 2c) also in test of Page 12 Line 4-9. It turned out that the precipitation was not extremely low right before and at the sampling year (Page 20 Line 19). Also, we have discussed their effects on soil enzymatic activity (Page 20 Line 20-22, Page 21 Line 1-2). So far, we have not get data of soils outside the treatment area. We will start to collect these data from this year as suggested by the reviewer.

The methods for developing theoretical dilutions for comparison with measured values need to be explained more clearly. As I understand it, the theoretical dilution value for, as an example, SOC content in a 50% amendment plot is simply 50% of the measured SOC in the control. This seems completely wrong and oversimplified, because the added sand contains SOC (see Page 7 Line 8). The theoretical dilution should be at least a weighted average the native soil and added sand or perhaps something more detailed based on the theoretical relationships between soil texture and properties. It is unclear how theoretical dilution comparisons serve to test the hypotheses in the manuscript, so an overall better description of the objectives of this method needs to be provided.

Response: We fully agreed with the reviewer's comment on calculating theoretical values as weighted averages between the native soil and added sand. In this case, we recalculated the theoretical values by considering both C and N contents in the added sand and native soils. We have updated the information in Page 11 Line 4-8, Page 15 Line 16-22, and Page 15 Line 1-2. The objective of this comparison between theoretical values and measured parameters has been stated at Page 15 Line 16-19.

Throughout the manuscript, there needs to be a stronger connection between the analyses performed and the hypotheses tested. There is a lot of listing of results in terms of things like enzyme activity and microbial biomass carbon, and while the connection to larger issues such as nutrient limitation is explained elsewhere in the paper (perhaps five pages previously), reading and understanding the results in the context of broader implications is an onerous task.

Response: Thanks so much for the constructive advice. We have provided the implications of our results in Page 23 Line 17-22, Page 24 Line 1-5. Also, we have clarified if our hypotheses were supported or rebutted (Page 17 Line 12, Page 19 Line 15, and Page 22 Line 21).