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Interactive comment on "Microbial communities and their predictive functional profiles in arid soil of Saudi Arabia" *by* Munawwar A. Khan and Shams T. Khan

Anonymous Referee #3

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The paper titled by 'Microbial communities and their predictive functional profiles in arid soil of Saudi Arabia' investigated the soil microbial communities using Illumina sequencing technique under different desert systems, semi-arid region vs. arid region. Although the author wants to explore the arable potential in this region through the presented experiment, the improper experimental design, unclear sampling process, inappropriate writing, and numerous grammar errors made the text should be reconsidered to publication. The content of the text only involved the changes in the microbial community structure, and did not involve the functions related to microbes, such as enzyme activities related to C mineralization and changes in NOx or soil N levels related to N mineralization, therefore it cannot reflect the meaning of "predictive functional profiles"

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in the title. The sampling points in each site were not enough to contrast the differences in soil community from semi-arid to arid regions and the sampling method is incorrect according to the current description. The author should set the sampling plots for collecting soils because it is impossible to set true repetitions at each site. Furthermore, the author did not detail describe the sampling method. What is the basis of sampling? How about the aboveground vegetation? What is the size of each sampling plots at each site? What points were collected in each sampling plot? How far apart between the sampling plots? In the Lines 49-51, why did soil samples distinguish between rhizosphere and non-rhizosphere soils only at Muzahmiyah? Line 49, why soil samples only collected from the upper soil of 0-5cm. Due to the contrasting rainfall and temperature among these sites, soil community in the deeper soil that greatly influenced by soil moisture should include in this study. The last and most important drawback of this experiment is why the chemical or physical properties of the soil, such as soil temperature, humidity, soil total carbon and nitrogen, are not measured when collecting soil samples. These parameters are more useful than the currently used parameters (annual average) to explain changes in the soil communities. Writing skills: Data analysis should write in another subtitle different from the others in the part of 2 Materials and Methods. Many abbreviations, such as Line 17-18 DMF and PIRUSt, should give their full name when they first present in the text. Many descriptions, such as Line 85-87, in the part of 3 Results and discussions should move into the part 2 acted as the background of sampling sites. Line 138-141, the results should be described in the order of the figures, first in Figure 4A and then in Figure 4B. Table 1, no note for the indication of M5 and M15. English grammar errors: grammatical errors existed throughout the whole text, need to rewrite. For example, in the Abstract, Line 11, 'Microbial community composition varied remarkably from other deserts and from one place to another. ' do you want to express 'the composition of microbial community varied greatly from site to site'? Line 13, 'Unlike other deserts', what do you mean? Line 14, 'Soils from the agricultural region of Abha were significantly different from other samples in containing only 1% Firmicutes and three to six times higher population of Actinobacteria and

Bacteroidetes, respectively ' do you want to express that 'Soil microbial community in the region of Abha contained only 1% Firmicutes, but the populations of Actinobacteria and Bacteroidetes were three to six times higher than the other desert regions.

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