

Interactive comment on “Evaluating the response of $\delta^{13}\text{C}$ in *Haloxylon ammodendron*, a dominant C_4 species in Asian desert ecosystem, to water and nitrogen addition as well as the availability of its $\delta^{13}\text{C}$ as the indicator of water use-efficiency” by Zixun Chen et al.

Anonymous Referee #2

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Authors have investigated the effect of precipitation change and increasing atmospheric N deposition on $\delta^{13}\text{C}$ of *H. ammodendron*. Numerous studies have doubted the ability of the carbon isotopic composition of C_4 plants as a tracer of water-use efficiency. The existing observations on positive/negative correlation between $\delta^{13}\text{C}$ of C_4 plants and precipitation change are extremely scanty, and most of the global records advocate for neutral relationship between them. I have some serious doubts on the experimental procedures which are as follows: (I) the age of the sampled leaves have not

C1

been mentioned in the manuscript. Usually, plants attain the final $\delta^{13}\text{C}$ at the end of the growing season, and there is a considerable difference between buds, young and matured leaves. The time-lag between actual $\delta^{13}\text{C}$ fixation in the plant and duration of the experimental process could be a valid reason for the correlation obtained in this work. (II) some of the experimental results do not give any definite conclusion. For example, authors have calculated the leakiness values, but at later stage discarded the values citing the no correlation between $\delta^{13}\text{C}$ and WUE. Rather than simply rejecting their measured leakiness values, authors should provide alternative concepts. Otherwise, the whole exercise becomes futile and should not be incorporated in the main text. Furthermore, desert environments are home for extreme climatic conditions; high day-time temperature, very low precipitation, strong difference between day and night time temperatures. Therefore, the $\delta^{13}\text{C}$ value of modern desert plants cannot be used an analogue of all the C_4 plants, and this work has very limited application. In terms of the presentation, the manuscript is poorly organised, difficult to follow at places, includes wrong information (example line 93) and does not provide any new insight into the subject. As per my opinion, the manuscript, at its current form, does not meet the standard for the publication in Biogeosciences. As authors have conducted tedious experiments, I am open to review the revised manuscript if they substantially modify the manuscript after addressing all the afore-mentioned points.

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C2