

Title: **The**Interaction of CO₂ concentrations and water stress in semi-arid **areas** **plants** causes diverging response in instantaneous water use efficiency and carbon isotope composition

Abstract: (changes are in red)

L10-14: It is commonly **reported** that ^{13}C fractionation occurs as CO₂-gas diffuses from the atmosphere to the sub-stomatal cavity. Few researchers have investigated ^{13}C fractionation at the site of carboxylation to cytoplasm before sugars are exported outward from the leaf. This process typically progresses in response to variations in environmental conditions (i.e., CO₂ concentrations and water stress), including in their **interaction**.

L14-17: Therefore, saplings of **two typical plant species found growing in semi-arid areas** of Northern China **of similar growing** status—*Platycladus orientalis* and *Quercus variabilis*—were selected and cultivated in growth chambers with orthogonal treatments (four CO₂ concentrations [CO₂] \times five soil volumetric water contents (SWC)).

L23-24: Differences in instantaneous water use efficiency (iWUE) according to distinct environmental changes differed between **the two** species.

L24-28: The WUE_{ge} in *P. orientalis* was significantly greater than that in *Q. variabilis*, while **an** opposite **trend was observed when comparing** WUE_{cp} **between the two species**. Total ^{13}C fractionation at the site of carboxylation to cytoplasm before **sugar export** (total ^{13}C fractionation) was clearly species-specific, as demonstrated in the interaction of [CO₂] and SWC.

L28-30: Rising [CO₂] coupled with moistened soil generated increasing disparities in $\delta^{13}\text{C}$ between **the**—water-soluble compounds ($\delta^{13}\text{C}_{\text{WSC}}$) and **estimates based on** gas-exchange **observations** ($\delta^{13}\text{C}_{\text{obs}}$) in *P. orientalis*, ranging between 0.0328‰–0.0472‰.

L34-37: Total ^{13}C fractionation **was** linearly dependent on g_s , indicating post-carboxylation fractionation **could be** attributed to environmental variation. Thus, clear description of magnitude and environmental dependence of apparent post-carboxylation fractionation is worth our attention **when addressing** photosynthetic fractionation.

Introduction:

Change

L42: ‘together with’ to ‘culminating in’

L43: ‘low water availability’ to ‘dryness’

L50 ‘environmental changes and their influences’ to ‘environmental change and their influence’

L51: ‘While the depletion’ to ‘While depletion’

L52: ‘itself might also affect the $\delta^{13}\text{C}$ of plant organs’ to ‘itself may affect $\delta^{13}\text{C}$ of plant organs’

L53: ‘climatic change’ to ‘changes in climate’

L55: ‘Discrimination against’ to ‘Discrimination of’

L57-58: ‘even the mesophyll conductance derived from the difference of CO₂ concentrations between intercellular site and chloroplast (Farquhar et al., 1982; Cano et al., 2014)’ the addition of this segment of text does not fit well with the preceding text, please rewrite

L67: change ‘the carbon discriminations that follow’ to ‘the carbon discrimination that follows’

L77: misspelt Farquhar’s name, please fix

L82; 'for the differences from' to 'for the differences in the'

L87: change 'magnitude of these carbon fractionations are related to environmental variation have not yet been investigated.' to 'magnitude of carbon fractionation is related to environmental variation that has yet to be fully investigated.'

L94-95: 'However, there is a dispute whether the fractionation stemmed...' to 'However, there is disagreement whether fractionation stemming...'

L97-99: awkward, please rewrite

L103: at the first mention of the growth chamber (use the full citation that you provide on L120-121)

L122-123: 'daytime temperature in chambers was set to $25 \pm 0.5^{\circ}\text{C}$ from 07:00 to 17:00, and the night-time temperature was $18 \pm 0.5^{\circ}\text{C}$ from 17:00 to 07:00' to 'daytime and nighttime temperatures in the chambers was set to $25 \pm 0.5^{\circ}\text{C}$ from 07:00 to 17:00 and $18 \pm 0.5^{\circ}\text{C}$ from 17:00 to 07:00'

Omit L 131 & 132.

L141-144: can this be simplified?

L148-154: can this also be simplified? Can you put this detail and the detail above in a table?

L165-166: this needs revising

L179: second R_{sample} needs to be change to R_{standard}

Throughout the manuscript: usage of CO₂ concentration, sometimes you use [CO₂] and other times you spell it out; try to be consistent; since you introduced [CO₂] why not continue to use it? The labels on some of the Figures are simply too small; please fix

What I provide above are some problems that I was able to identify, without having to address every line of the manuscript. There are many more problems with the writing and I would suggest that you get professional editing help in rewriting the manuscript. A lot of the problems I identify are associated with grammar and ways of expression. The three referees that I had review your manuscript all agree that the material is publishable based on scientific merit. However, I feel the manuscript needs considerable work to make it stand out. I will give you opportunity to fix the problems. I would like to see the revised manuscript again before making a final decision.