

HESS-2023-12

Title: The degree and depth limitation of deep soil desiccation and its impact on xylem hydraulic conductivity in dryland tree plantations

Author(s): Nana He et al.

MS type: Research article

Iteration: Minor revision

Dear Xiaodong Gao,

thank you for reaching out to me and please excuse my confounding my notes between the old and new version of the manuscript when compiling the text of the revision!

Here is the correct answer:

Thank you for adding information to the discussion which improves the manuscript. There is still one instance where the misleading wording remains (see below, Line 474) that needs amending. I also have some specific comments on the new discussion section that should be easy to implement.

I kindly request that you consult a professional English language editor to improve the grammar of the manuscript. There are several instances where the language is hard to understand, partly the sentences miss verbs and therefore do not make sense. I have noted some below, but they are only examples. The manuscript would benefit a great deal from proofreading.

I am looking forward to the revision. Best regards,

Anke Hildebrandt

Response: Thank you very much for your great patience and constructive comments on our paper, we have carefully revised the misleading wording and inappropriate

expressions in the discussion section (specific modifications are explained item by item in the following text). In addition, the English of the whole manuscript has been edited by a native English-speaking editor. We hope that the revisions in the manuscript will be sufficient to make our manuscript suitable for publication in *Hydrology and Earth System Sciences*.

Line numbers refer to the tracked-changes version of the manuscript:

Line 392-393: „Therefore, the small spatiotemporal variation of PWP in deep soil may also indicate the lowest DSMD was close to DSMD at the local PWP. “The meaning of the sentence is unclear

Response: Thanks for your comments. This sentence has been deleted in the text because it is less relevant and somewhat misleading.

Line 402-404: „Divergence in the maximum RWU depth of the same tree species examined at different sites mainly due to tree adopting different biomass allocation strategies to adapt to varying drought aridity “verb is missing, meaning unclear

Response: Thank you for your suggestion. The verb has been added in the text (Lines 407-409).

Lines 407-409:

“Divergence in the maximum RWU depth of the same tree species examined at different sites was mainly due to trees adopting different biomass allocation strategies to adapt to varying drought aridity.”

Line 411-412: „In contrast, due to substantial human intervention such as canopy pruning, the maximum RWU depth of *M. pumila* plantations across different sites both

were between 18.0-22.0 m. “This relation between pruning and rooting depth was not investigated. Therefore this is rather an assumption, but not a fact. Please rephrase accordingly. Also above in „Data sources “for the literature data study, you state that sites subject to pruning were not used. It would be good to mention which field sampled sites were subject to pruning.

Response: Thanks for your comment. According to our knowledge, almost all apple orchards are subject to regular canopy pruning every early spring in order to maintain stable productivity on China’s Loess Plateau and maybe in other regions of the world. In line 415-417, the “canopy pruning” here means the regular canopy pruning in early spring, which happens every year during the whole growing period of apple trees. On the other hand, the “pruning” in the statement that “Experiments with only shrub and grass communities or experiments with irrigation, mulching, pruning and/or other measures were excluded” in the section 2.1.1 means additional canopy pruning than regular pruning. The “additional canopy pruning” denotes those experiments are subject to specially designed pruning, e.g., reducing intensive transpiration, in addition to regular pruning. For instance, our previous study showed that moderate (trimming 25% of all branches) and heavy (trimming 40% of all branches) pruning reduced growing-season transpiration by an average 10.4% and 28.5%, respectively, in order to avoid negative effects of prolonged droughts (Ye et al., 2021). The text has been edited for clarity as follows.

Lines 415-417: “In contrast, due to substantial human intervention such as regular canopy pruning in every early spring during growing periods, the maximum RWU depth of *M. pumila* plantations across different sites both were between 18.0-22.0 m.”

Lines 100-101: “(3) Experiments with only shrub and grass communities or experiments with irrigation, mulching, additional pruning in addition to regular canopy pruning and/or other measures were excluded.”

Reference:

Ye, M., Zhao, X., Biswas, A., Huo, G., Yang, B., Zou, Y., Siddique, K. H. M., Gao, X.:
Measurements and modeling of hydrological responses to summer pruning in
dryland apple orchards, *J. Hydrol.*, 594, 125651,
<https://doi.org/10.1016/j.jhydrol.2020.125651>, 2021.

Line 413: „inconsistency “It is unclear, what concrete inconsistency is meant. Please add.

Response: Thanks for your comment. Here we mean that the maximum root water uptake depth of *M. pumila* and *R. pseudoacacia* examined in the semiarid Mizhi site is different. Therefore, the word “inconsistency” has been changed to “difference” in the text (Line 418).

Line 440-443: „The variations across different sites are mainly attributed to the degree of deep soil desiccation and the disparities in shallow soil moisture influenced by precipitation. “This sounds as if referring to the xylem hydraulic conductivity, mentioned in the previous sentence. However, there is no analysis of how the variation of that variable relates to shallow soil moisture, as far as I can see. Can you specify which variation is meant and/or maybe rephrase the sentence to sound more hypothetical?

Response: Thanks for your comment. The variation here refers to the native percentage loss of xylem hydraulic conductivity (*NPLC*). This sentence has been rewritten for clarify as follows (Lines 438-440).

Lines 438-440:

“The variation of *NPLC* across different sites can be mainly attributed to the degree of deep soil desiccation as well as probably the disparities in shallow soil moisture influenced by precipitation.”

Line 443 „of water potential “do you mean „of leaf water potential“?

Response: Yes, it is. The text has been edited (Line 441).

Line 441:

“...resulting in the leaf stomata closing to prevent excessive reduction of leaf water potential.”

Line 474: „plantation across different sites both reached [...] and the maximum RWU depth “This sentence still conveys the misleading wording.

Response: Thanks for your comment. We have modified the sentence as follows (Lines 469-471).

Lines 469-471:

“except for *R. pseudoacacia* plantation in Mizhi, the 24-28-year-old *M. pumila* and *R. pseudoacacia* plantations sampled in this study reached both the soil moisture limitation and the maximum RWU depth across different sites.”

Line 480: „Furthermore, except for the *R. pseudoacacia* forests in Mizhi may rely on deeper soil moisture, the maximum RWU depth of other plantations was within the sampling depth“ I meant to comment on this earlier: This sentence does not contain a lot of information as written. Do you mean to say that the RWU depth varied between sites?

Response: We have modified the sentence as follows (Lines 475-477) according to your comment.

Lines 475-477:

“Furthermore, the maximum RWU depth of the trees varied between sites in the plantations where soils were sampled.”

Table 2 Caption: „Basic information for the trees reaching the soil moisture limitation (lowest deep soil moisture deficit)“, would better be: „Basic information for the trees showing the lowest deep soil moisture deficit“

Response: Thank you for your suggestion. We have modified the caption of Table 2 as follows (Lines 156-157).

Lines 156-157:

“Basic information for the trees showing the lowest deep soil moisture deficit at each site sampled in the field.”