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Discussions

Interactive comment on "Reshaped acclimation traits of dominant tree species under manipulated rainfall would alter their coexisting relation in a low-subtropical secondary evergreen forest" *by* Lei Ouyang et al.

Anonymous Referee #2

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Reshaped acclimation traits of dominant tree species under manipulated rainfall would alter their coexisting relation in a low-subtropical secondary evergreen forest

Authors: Ouyang et al.

Summary This study examined various factors, including transpiration rates, intrinsic WUE, sapwood to leaf area ratios, and water source use of two tropical trees under two precipitation exclusion treatments. The study found differences in transpiration rates between the wet and dry periods, and that the exclusion treatments reduced

transpiration rates in both species. The study also found a difference in soil water use between the two species, with one using more shallow and the other using deeper.

General Comments This manuscript tackles an interesting question related to how decreases in precipitation influences tropical forests, since more intense wet and dry periods are predicted for the future. The combination of measurements (transpiration, WUE, source water use) were all important in understanding what the mechanisms were for different water use strategies. However, there were several weaknesses with the paper that made it difficult to recommend for publication. 1) The objectives of this study were not particularly exciting. Why was the main objective simply to examine different water use strategies by different tree species? This study utilized two precipitation exclusion treatments, ED and DD, and these different deliveries of moisture provided a unique opportunity to ask more targeted questions and/or hypotheses. This was a missed opportunity. The second objective was to examine if the mechanism responsible for the differences were due to transpiration, morphological adjustment, or WUE. Again, this is not particularly exciting because the answer to this question is yes, all of these likely differ (or not differ) between the two species. The more important question is, if they do differ (or not differ), why? Can you provide some hypotheses on how you might think each species may respond both physiologically as well as morphologically to the different treatments? 2) This manuscript would also benefit a lot by providing a more clear picture of when measurements were made. For example, the statistical analysis section seemed to imply that analyses were made at monthly time intervals, but the method section described making many of the collections at the end of the experiment. It wasn't clear how monthly time scale analyses could be made if there were only one set of collections. 3) The Results section lacked reporting of the statistical analyses. This needs to be addressed. Without the statistical outputs, it's hard to evaluate if any of the findings were true. 4) Despite having two different precipitation exclusion treatments, the results are not discussed at all in the Discussion section. 5) The Discussion section should be improved to provide a cohesive story about whether or not species differences matter, or it different water treatments matter.

I found this discussion difficult to follow because it read as many disjointed sentences highlighting when the two species behaved differently and when they behaved similarly.

Specific Comments

Title: I recommend changing the title of this manuscript. The idea of "reshaped acclimation traits" is not very clear, and neither is "would alter their coexisting relation." The title should represent the key findings of the study and I don't think either of these phrases capture that.

Line 32. The idea that physiological differences alone would explain shifts in species composition is a bit of an overstretch. What about seedling recruitment and seedling success? I would recommend ending the abstract based on the findings.

Line 41. Change to "...with much MORE SEVERE environmental conditions..."

Line 48. Change to "...for forest trees, new and appropriate forestry management strategies ARE NEEDED in the future."

Line 98. The paragraph begins with highlighting the fact that studies linking changes in rainfall and vegetation water use are typically addressed in semi-arid and arid ecosystems and that tropical areas are largely ignored. However, the citation of del Castillo (2016) for Aleppo pine refers to Mediterranean climates. Another citation would be more appropriate here.

Line 112. Insert "...the soil water recharge from SHALLOW precipitation..."

Line 128. What specific traits do "changed traits" refer to here?

Line 134. "...and the stable isotope composition of xylem and soil water." Isn't the use of stable isotope part of examining spatial-temporal water use patterns (from objective #1)? Using isotopes to trace water is a tool, not an underlying mechanism.

Line 144. Insert "...after more than two-decadeS OF natural growth."

Line 149. "...and is evenly distributed, with more than 70% of rainfall occurring from April to September..." This sounds contradictory. How can rainfall be even distributed if more than 70% falls during the wet season? Is this referring to spatial distribution somehow?

Line 165. I'm not sure I understand the rationale in the precipitation exclusion treatments between ED and DD. If the dry period is from October to March and the ED period reduces precipitation from April to May, how is this different than DD?

Line 167 also says "...whereas for the ED treatment, 67% of throughfall was excluded in the spring (April-May) to simulate spring drought and prolonged dry season." This may extend the dry season by excluding precipitation into May, but was precipitation not altered during winter (October to March)? Some additional text explaining the rationale for the precipitation treatments would help clarify this.

Line 216. At what depths were soil samples collected for SWC measurements?

Line 239. Change to "...BRANCH BARK WAS removed..."

Line 247 and 248. What do the "n=4" refer to? Were there only four trees used in this calculation of leaf biomass? If there were five replicate trees per species for each treatment, it's unclear where n=4 comes from.

Line 292. How were monthly differences in whole-tree and branch As:Al calculated? I was under the impression that As:Al was calculated at the end of the experiment. Also, were leaf tissue collected for d13C also collected monthly? Also, the previous section says that xylem water, soil water, and precipitation were collected at the end of the experiment. How can monthly differences then be calculated?

Line 293. Again, it's unclear if measurements/collections were made monthly or at the end of the experiment, so it's not clear if the LSD post hoc test is the best. If monthly measurements were made on the same sets of trees, a repeated measures analyses makes more sense.

Line 326. “M. macclurei transpired more water than S. superba. . .” I’m not sure what data support these findings

Line 338. Why was transpiration of trees from the ED treatments lower during the winter if rain was not excluded during the winter?

Lines 343-350. I would consider revising this section because it’s hard to keep track of the decreases in transpiration rates between different seasons.

Line 352-355. Please report the statistics here.

Line 355-356. Please report statistics here.

Line 357. “To be specific, the branch and whole-tree As:Al of M. macclurei were 7.7% $\sim$ 30.7% lower than those of S. superba among the different rainfall treatments ($p<0.005$).” This is unclear – is the p-value saying that all M. macclurei treatments (BC, EE, ED) were significantly lower than S. superba? If so, why were the control, BC, treatments different?

Line 362. “Whereas for the same tree species, sampled trees in three different manipulation precipitation blocks shared similar whole tree As:Al values.” What does this mean?

Line 367. “Normally, the rainwater use of M. macclurei for BC and ED treatments was higher than that of S. superba, but not for the treatment of DD.” Please show the statistics.

Line 377. “. . .S. superba was inclined to use more deeper water and groundwater than M. macclurei.” Please show statistics to support this.

Section 3.4 It’s still unclear to me if xylem water was collected only once during the experiment (at the end), or if samples had been collected during winter, spring, and summer.

Section 3.5 Statistics are missing almost entirely from here. If slopes of one treatment

is higher than another treatment, please include the statistics. If the slope were not different, please show the statistics as well.

Discussion section. I recommend beginning with a summary of the key findings from this study before launching into the details of each type of measurement.

Line 424. “. . .species would be less access to water and can further reduce the risk of xylem cavitation. . .” I’m not following this argument.

Section 4.1 I don’t see any discussion of how the different treatments influenced water use.

Table 2. The letters used to discern differences between BC, DD, and ED treatments are quite confusing. For example, why are different letters used for Branch As:Al (b, c, d) compared to WUEi (a, b). This almost implies that WUEi and As:Al were compared, when they clearly were not.

Figure 2. The letters used to show differences in SWC are too complicated. Please remove and just report the statistical findings. Why are lower case and capital letters both used? The Figure legend does not explain any of this.

Figure 3. Instead of splitting the daily E into dry, spring, and summer, I would plot daily E along one time axis. The way this figure is currently set up, the time intervals are different between panels a, c, e, and b, d, f. A better way is to highlight the different periods of the precipitation in one panel, and have M. Macclurei on top, and S. superba on the bottom. Also, why is ED lower during the dry season (Oct – Mar) if precipitation was not excluded during this time?

Figure 4. No statistics here. Why?

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