Biogeosciences
Discussions
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Interactive comment on "Drought in forest understory ecosystems – a novel rainfall reduction experiment" *by* K. F. Gimbel et al.

Anonymous Referee #3

Received and published: 22 October 2014

General comments

The paper describes the design and creation of a rainfall partial-exclusion experiment to allow study of the effects of drought on the function and diversity of plants in the forest understory. Results are only presented for the first year of monitoring and so much of the focus is on proof of methods. The Material and methods section is much the longest of the manuscript. The experimental design appears well thought out and the first three figures are a useful aid to the reader. The use of language and grammar is generally good throughout.

The Results section, in places, fails to present statistical justification for the claims made and I had considerable difficulty in understanding two of the figures (Figures 4 and 6). We are told only that drought conditions had no effect, in this initial period, on

growth parameters. I would, nevertheless, have liked to see some of the supporting data - perhaps in an appendix.

The Discussion again makes a number of claims that appear unsupported by the results as presented here. The question of whether the authors expect drought effects to be more pronounced over short or long periods is rather vague here – in contrast with the final sentence in the Conclusion.

In my opinion, the detailed aims of this pilot study could be made more explicit at the start (e.g. reduction of rainfall whilst avoiding any associated effects on air temperature or humidity). Those same points could then be summarised in the Conclusion.

Specific comments

1. Introduction:

14321-15 The opening sentence is perhaps too bold – what about soil structure, biota, nutrient availability?

14322-15 I had to read the phrase 'alleviate competitive exclusion of subdominant species' several times – the idea is that difficult conditions could increase biodiversity. Try to rephrase in positive language.

2. Material and methods:

The second, third and fourth paragraphs of 2.1 are repetitive. Could all this be summarised in a table?

14326-17 Is re-entry of water not also a problem (or more of a problem) at flat sites?

14327-26 I found this adjustment calculation hard to follow in text. Could you include a formula to show the working?

14329-4 What is matric potential?

LAIsp – describe this as species-level leaf area index. See next point about SLA.

Specific leaf area (SLA) has a widely accepted definition in the literature (mm2 mg-1) which is not what you want here. Need to find another term for LAsp.

Useful to explain what a phytometer is. I take it as a group of plants used as a measure of physiological responses, but it sounds like a piece of equipment.

3. Results:

The second paragraph of 3.1 dealing with the rainfall patterns by site and season is difficult to read and follow – lots of repetition. And I found Figure 4 difficult to interpret – especially the panels at the top.

Section 3.2 – much of this (up to the sentence starting 'Air temperature ..') doesn't look like it belongs in the Results section.

Section 3.3. I had great difficulty understanding Figure 6. No statistical analysis is offered to underline the effects at Site/Plot/Depth/Distance – not all of these classes are different from the control plots.

"The reduction was strongest in (in) the top soil layer (5cm) of all plots at a distance of 3 and 4 m from the centre tree." But is that true? 2 m bars look just as strong in AEW8 and AEW13. And reductions in AEW8 are most pronounced at a depth of 15 cm (3 m distance).

Section 3.4 No statistical justification is given for the assertion that "There were no significant differences between the total coverage of the sites". I would argue that 40.3% is much greater than 27.9%.

Table 3 – again we are shown no results of the Kruskal-Wallis test. For example at AEW8, at first glance 0.796 Control looks much higher than 0.462 Roofed.

Table 4 – I was confused by the values (p-values? Values are error probabilities?) What does the (intercept) line refer to?

Figure 7 – The boxes are squashed because of the single high outlier at SEW. Could

this be excluded from the analysis? The y-axis then would be much shorter and comparisons among the boxes much easier. Lettering could be applied to the boxes to indicate those that are significantly different, one from the other.

4. Discussion:

Section 4.2: I don't understand the meaning of " .. points to a comparable coupling of airspace on both subplots."

I don't agree with the statement " The drought treatment clearly reduced soil moisture content in all depths in all plots."

5. Conclusions – tie these back to explicit aims laid out in the Introduction.

Technical corrections

Watch the spelling of understory (instances of understorey also).

Exploratories is not a word I know. Explorations?

Can you find another term for sub-subplot? Minor-plot?

14322-9 Rephrase e.g. ". . .. . . as might be the case in a future Europe.

14323-8 Omit 'to be able'.

14323-10 Omit 'above the forest floor'.

14323-20:23 Really belongs in the Methods.

14326-27 Replace 'random' with variable.

14330-16 Replace 'per' with of.

14331-8 Briefly describe the chambers rather than asking us to look up Yepez et al.

14331-14 What is (MESZ)?

14333-3 '. . .we had to increase the reduction..' needs to be rephrased

14333-13 'excluded' is better here than 'reduced'

14335-6 coverage here refers to vegetation, but elsewhere you talk about roof coverage. Important to be explicit and make these distinctions clear for the reader.

14335-23 should refer to Table 4 not Table 3.

14336-14 Replace 'calculative' with 'calculation'

14336-17 Replace 'reducing' with 'excluding'

14336-8 Replace '..can reach a maximum of..' with '..by as much as..'.

14338-23 Rephrase e.g. "Changes in ecosystem functioning occur after stress conditions exceed ..."

14339-22 Rephrase e.g. " . . . a valid, and more realistic, alternative to the common. . ."