

Biogeosciences Discuss., referee comment RC1  
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## **Comment on bg-2021-217**

Anonymous Referee #1

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Referee comment on "Water uptake patterns of pea and barley responded to drought but not to cropping systems" by Qing Sun et al., Biogeosciences Discuss.,  
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The manuscript by Qing Sun and colleagues does certainly address a topic within the scope of the journal. The authors used water stable isotopes to determine the effect of limited water availability on water uptake of a mixture of pea and barley. The data are certainly interesting and contribute to shedding some light on the still poorly understood role of soil management in coping with the consequences of climate change. Overall, I find it a good study, well structured, and clearly written.

I have a few comments, mostly minor.

Among the keywords there is "FAST": I do not understand what it means and how it should be a keyword for this paper.

The introduction is not particularly fluent. For example:

Row 38 – more frequent and more severe than what?

Row 40 – Aggravating respect to what?

Row 42 – the word "adapted" is superfluous and misleading (not clearly explained adapted

to what)

Row 60 – “illustrating the current gap of knowledge for cropping systems” not sure what does this mean.

Regarding the methods:

row 85: reporting also the altitude of the experiment would be useful.

Row 106: what was the proportion of pea and barley in the mixture?

Row 142: a short explanation of how cryogenic vacuum distillation was performed would be advisable.

Row 145: which peripheral was used?

Row 146: I do not understand the citation of Werner et al 1999 since this paper describes the analysis of nitrogen and carbon stable isotopes. Please clarify or change with a more appropriate citation.

Row 180: I'd suggest modifying the naming of the treatments. The term “after treatment” is (to me) a little confusing because the treatment had already been finished for a couple of weeks at the moment of sampling. In the M&M section, it is explained that the terms refer to the phases, but, still, it is confusing. For example, in table 1 it is reported a period “before drought”, which makes sense, and “after drought”, which also makes sense, but also a period “end of drought”, which does not make sense since this is the period during which the drought actually took place! Maybe it would be better to call the last sampling something like “after rain” or “end of experiment” or simply “last sampling”.

Results

Row 210-211: also the fact that soil water content in the low tillage plots at 40 cm was

higher in the drought plots than in the "control" plots should be highlighted and discussed

Row 213-218: I do not understand the relevance of reporting the soil and xylem water results with respect to the LMWL since this aspect is not further discussed. It might be of certain general interest to see if there is any difference due to the drought, but it is my understanding that the data in figure S1 are reported for the whole vegetative season.

## Discussion

The main point that, in my opinion, is missing from the discussion is considering the type of soil. I understand that different species may act differently because of their genotype, but soil type (texture, bulk density, and soil organic matter content in particular) has a huge influence on soil water fluxes and root distribution (of any species). In addition, the soil type may influence the effect of soil management on plants' behavior, water uptake in this case.

## Other comments

Row 340 – but in the low tillage plots soil moisture at 40 cm is higher in the drought treatment than in the control. How do you justify this behavior?

Row 355 – do you think that plants had enough time during the drought period to adapt their root distribution?

Row 367 – table 5 does not show the water uptake during the "natural dry" (I suggest changing to "naturally dry") period.

row 389 – what does "\_ENREF\_5" mean?

Row 403-404 – in stating that there is no difference in MPC due to the cropping system,

have you considered the difference between before and end of treatment? By doing a very rough calculation, it seems to me that there might be some influence of the treatment at least in peas.

## Tables and figures

Table 5 – the legend is not clear: the effect on what? [I guess it is on the MPC, but it is not clear from the legend]

Table 5 is very dense and difficult to follow. It would be easier to read if the letters were closer to the respective number. Or consider splitting in two.

Fig. 6 – are these data pooled for all soil managements? Please specify in the legend.