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Comment

***Interactive comment on* “Biomass production in
experimental grasslands of different species
richness during three years of climate warming”
by H. J. De Boeck et al.**

Anonymous Referee #2

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This paper reports an experiment on single and combined effects of air warming and species richness on the biomass production in experimental grassland communities. The experiment was performed in 12 sunlit climate-controlled chambers where a series of 24 different grassland communities of varying species richness were grown. Three levels of species richness were considered: 1, 3 and 9 species. Data on aboveground and belowground biomass is presented.

This is an interesting experiment as it addresses the effect of higher temperatures and species richness on grassland biomass production.

Although I have two major concerns about this paper that I present below. The first is

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from a methodology point of view and the second is on the publishing strategy of the authors.

1- In order to avoid a confounding effect between species richness and species identity the authors used species from three functional groups to create each of the $S=3$ communities, with each species combined only once with any other species (page 4610). Nevertheless, the six replicates of the $S=9$ communities always used the same 9 species (total pool of species) with a different internal arrangement. In this way, species composition is confounded with species richness and there can be a variance reduction effect (sensu Huston 1997). For example, this is probably why when comparing RSDs, the differences in root distribution between communities proved smallest at $S=9$ (page 4613, line 22).

2- While reading this paper one is referred to other papers on the same experiment written by the same authors (or part of the authors) mainly in the discussion section (for example page 4614 and 4615). The authors decided to have data from this experiment published in several papers:

- a) a paper on the effect of climate warming and plant species richness on water use (De Boeck et al. 2006a),
- b) a paper on above- and below-ground productivity (first growing season) (De Boeck et al. 2007a),
- c) a paper on CO₂ fluxes ((De Boeck et al. 2007b),
- d) a paper on photochemistry (Gielen et al. 2007),
- e) and now a paper on above and below-ground productivity over the three years of the experiment.

The authors are entitled to follow this strategy of publication and, as scientists, we all understand that publishing is crucial for career development (publish or perish!). However, I have the feeling that this approach can lead to some overlap and may hinder a

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more substantial and clear contribution that could have been made if, for example, this paper had included at least data on water use and availability. This was the approach followed in De Boeck et al. (2007a) where above- and below-ground productivity during the first growing season of this experiment was discussed including the soil water data which gave a much more comprehensive approach to data interpretation and analysis.

Other comments/questions:

Page 4607, line 22-23: "The complementarity (including facilitation) and the selection effect are thought to operate simultaneously, ...". This is not correct. It is not obligatory that these effects operate simultaneously. It should be "The complementarity (including facilitation) and the selection effect can operate simultaneously...".

Page 4610, line 13: It is referred that plant species used in the experiment had different temperatures and drought resistances. It could be interesting to explore the functioning of individual species in terms of temperature and drought resistance with the outcome of community biomass. Did you do any analyses on this?

Page 4610, line 27-28: Citing also De Boeck et al. (2007a) can help to understand the design of the experiment.

Page 4611, line 11: There is a gap between several of the soil slices. Why does this happen?

Page 4612, line 21: "consecutive periods (Fig. 1a)." Should be "consecutive periods (Fig. 1A)."

Page 4613, lines 1-8: "Neither warming nor species richness affected the ratio below-ground versus aboveground biomass.". As it was observed before (De Boeck et al. 2006a) "both the absence of a groundwater table and the container size (60 cm depth) may have been responsible for this, by limiting the extra quantities of water that could be extracted from the soil through root proliferation". This also should be addressed here.

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Page 4616, line 13-16: "The method of additive partitioning revealed that the increase from monocultures to multi-species communities... and mostly non-significant." This phrase is not very clear. The increase from monocultures to multi-species communities is referred to what?

The English in this paper should be improved. Below are some examples where some clarification is needed:

Page 4608, line 6-7: "As dry soils would already be more frequent and severe..."

Page 4608, line 20: "...how important are complementarity and selection,". This should read "...how important are complementarity and selection effects,"

Page 4608, line 21: "...between the two global changes under consideration?". It would be better "...between the two global change factors under consideration?"

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