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Biogeosciences Discussions

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.

H. J. De Boeck et al.

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We will comment on the most important issue raised by this referee (see below). The two other issues raised by the referee will be resolved in the full revision.

Ref 1: "Specific comments: I only see some minor flaws in this study, and the authors may want to comment on these issues: Most importantly, the design confounds species richness (S) and the presence of key functional groups (FG), namely nitrogen-fixing legumes. While all mixed communities are composed of all three functional groups (legumes plus grass plus herbs), the monocultures are - obviously - not. It is well known from both agricultural and ecological studies that legumes positively influence biomass production in mixtures with non-fixing species due to an N-fertilization effect

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(facilitation). This effect also occurs in rich agricultural soils (as used here, additional information on soil nutrient content would be helpful) and disappears only at rather high levels of N fertilization. Thus, by comparing biomass production along the gradient of S, the significant diversity effect could be attributed solely to the presence/absence of legumes. This would also explain why there were no differences between the 3- and 9-species level. I suggest to include the facilitative effects of legumes into the discussion about the underlying mechanisms of increased biomass production in mixtures."

Author reply: The referee is generally right here. However, this does not imply an unrealistic experimental design. The facilitative effect of legumes is one of the many ways in which communities are able to be more than just the sum of the parts (i.e. complementarity). As such, the presence of N-fixers is an integral part of the important complementarity effect we observed (Fig. 2). To stress and clarify this, we will more explicitly discuss the importance of N-fixers in the revised manuscript, as suggested by the referee. We will also argue, using data of ET (p.4617li.1-2), that it is unlikely that the presence of legumes is the only factor that led to a significant complementarity effect in multi-species communities.

Interactive comment on Biogeosciences Discuss., 4, 4605, 2007.