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Interactive comment on “A positive correlation between plant diversity and productivity is indirectly caused by environmental factors driving spatial pattern of vegetation composition in semiarid sandy grassland” by X. A. Zuo et al.

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General comments: The authors deal with plant diversity-productivity relationship which has received considerable attention among ecologists. Although the result of the field investigation itself involves little new findings, they carefully analyzed direct and indirect drivers controlling diversity-productivity relationship using SEM and several multivariate analyses, which worth the publication. However, the following question should be clarified and justified: The vegetation of this region has long been managed (or degraded) by human activities such as agriculture and livestock grazing. The authors

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should clarify how they excluded or controlled the effects of such agricultural/grazing activities in selecting sites and carrying out surveys. This potentially interesting paper is also seriously spoiled by poor English with lengthy description. English editing by natives should be essential.

Re: All the comments given by the reviewer are very valuable. We chose the 60 fenced sites which are excluded land use. Horqin Sandy Land which locates in a semi-arid agro-pastoral transition zone has undergone severe desertification since the mid 1970s, primarily due to improper land management, extensive fuel-wood gathering and heavy grazing (Liu et al. 1996). However, owing to the annual precipitation of 350–500 mm, some degraded vegetation could be gradually and naturally restored after excluding destructive land uses. Due to vegetation restoration, sandy desertification in this region has been reversed since 2000 (Wang et al., 2004). We had added this section description in description of study area. Moreover, the previous study in these choosing sites have been published in Geoderma (Zuo et al., 2012). In addition, concerning the writing of paper, Knops who is one of editor in Ecology Letter, helped me revise the English Language. Also he is one of authors in this paper.

(1) Wang, T., Wu, W., Xue, X., Sun, Q.W., Chen, G.D., Study of spatial distribution of sandy desertification in North China in recent 10 years . Sci. China Earth Sci.,48, 78-88, 2004. (2) Zuo, X.A., Zhao, X.Y., Zhao, H.L., Zhang, T.H., LI, Y.L., Wang, S.K., Li W. J. R., P.: Scale dependent effects of environmental factors on vegetation pattern and composition in Horqin Sandy Land, Northern China. Geoderma, 173-174, 1-9, 2012.

Specific comments:

1. Page11800, line2-3. Is the quadrat size (1*1m) large enough to estimate productivity of shrub-dominated stands with high spatial heterogeneity (e.g. *C. microphylla* and *A. halodendron*)?

Re: Because *C. microphylla* is a very few shrub and *A. halodendron* is small low shrub which just appeared in semi-fixed dune in our study sites, we only use 1*1m quadrat to

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estimate its productivity. In addition, this quadrat size (1*1m) is also used to do some biomass measure for this two shrubs in the following previous papers which has been published in international journals.

(1)Zhang JY, Zhao HL, Zhang TH, Zhao XY, Drake S. Community succession along a chronosequence of vegetation restoration on sand dunes in Horqin Sandy Land. *J Arid Environ* 62:555–566, 2005. (2)Zuo, X.A., Zhao, X.Y., Zhao, H.L., Zhang, T.H., Li, Y.L., Wang, S.K., Li W. J. R., P.: Scale dependent effects of environmental factors on vegetation pattern and composition in Horqin Sandy Land, Northern China. *Geoderma*, 173-174, 1-9, 2012. (3)Zuo, X.A., Zhao, X.Y., Zhao, H.L., Zhang, T.H., Guo, Y.R., Li, Y.Q. Huang, Y.X.: Spatial heterogeneity of soil properties and vegetation-soil relationships following vegetation restoration of mobile dunes in Horqin Sandy Land, Northern China. *Plant Soil*, 318, 153-167, 2009. (4) Li, F.R., Zhao, W.Z., Liu J.L., Huang, Z.G. Degraded vegetation and wind erosion influence soil carbon, nitrogen and phosphorus accumulation in sandy grasslands. *Plant Soil*, 317:79–92, 2009.

2. Page11804, line18-20. Is the result of the differences in soil water contents among three dune types (not significant) consistent with previous studies?

Re: The comment of reviewer is valuable. In paper, the not significant result in soil water contents among three dune types is consistent with previous study (Zuo, et al. 2012), but is also not consistent with Zuo, et al. 2009. In this paper, we chose 32 sites (including three different dune types) in study area and use the ordination technique of non-metric multidimensional scaling to classify the three vegetation types, then do some difference test in soil water content among three dune types. However, in Zuo, et al. 2009, we only chose each site in each dune type (total three sites). In order to use the geostatistics method to do the analysis of spatial heterogeneity of soil water content, we had to measure soil water contents in a lot of samplings in one site, due to the requirement of geostatistics method. The possible reason is that the number of sites and analysis is different, which results in the significant and not significant in soil water content among three dune types.

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(1)Zuo, X.A., Zhao, X.Y., Zhao, H.L., Zhang, T.H., LI, Y.L., Wang, S.K., Li W. J. R., P.: Scale dependent effects of environmental factors on vegetation pattern and composition in Horqin Sandy Land, Northern China. *Geoderma*, 173-174, 1-9, 2012. (2)Zuo, X.A., Zhao, X.Y., Zhao, H.L., Zhang, T.H., Guo, Y.R., Li, Y.Q. Huang, Y.X.: Spatial heterogeneity of soil properties and vegetation-soil relationships following vegetation restoration of mobile dunes in Horqin Sandy Land, Northern China. *Plant Soil*, 318, 153-167, 2009.

3. Table A3. *Typha orientalis* shows negative relationship with NMDS2, is it true?

Re: The comment of reviewer is right. We have checked and revised this error.

Interactive comment on *Biogeosciences Discuss.*, 8, 11795, 2011.

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