

Interactive comment on “The interaction between nitrogen and phosphorous is a strong predictor of intra-plant variation in nitrogen isotope composition in a desert species” by J. Zhang et al.

Anonymous Referee #2

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This study presented interesting data on intra-plant variations in ^{15}N of *Nitraria tangutorum* in northwestern China. Plant ^{15}N has been widely used in various studies on plant physiology and N cycles, because it can provide information about N pathways through ecosystems. As the authors clearly state in Introduction, most of these studies examine ^{15}N variations across plant species or sites with different soil N properties. Therefore, it is crucial to study mechanisms underlying the intra-plant ^{15}N variations. The Introduction section is concise and well written, and presenting the significance of studies on factors governing the within-plant ^{15}N variation, such as N pool in plant

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tissues. However, the results presented in this study (C, N, P concentrations of each organ) seem not adequate to explore the mechanisms that the authors intended to reveal and consequently I could not find convincing arguments in the current version of the manuscript. I think that there are number of issues to be addressed before recommendation can be made for publication in Biogeosciences.

General comments: It is unclear why the authors measured P and C concentrations (and the ratios) and examined the relation between P and plant ^{15}N . To explore the intra-plant ^{15}N variation, it seems to be important to investigate N pools in each organ as the authors mention in the third paragraph of Introduction. Please add explanations about the rationale of the C, N, and P measurements of each organ. In addition, most of the arguments in Discussion were concerning not intra- but inter-plant ^{15}N variations across sites with different soil N properties or among plants associated with mycorrhizal fungi. Although the authors propose that N volatilization from plant organs is a factor determining the ^{15}N variation, no evidence was presented. It would be necessary to reorganize this manuscript to make arguments based on the obtained results and relevant studies (e.g., Cernusak, Winter & Turner 2009 *Plant Physiology* 151: 1667-1676; Gauthier et al. 2013, *Plant Cell Environ* 36: 128-137). Finally, I noticed that Materials and Methods section of this manuscript seems to be quite similar to the previous manuscript on intra-plant variations in ^{13}C , which the authors have published in this journal. I believe that copying sentences word for word of previous manuscripts should be avoided even if the authors were identical and citations were properly indicated.

Minor comments: P18772L8: A reference would be needed. P18773L19-22: Other mechanisms, such as amino acid synthesis, also can affect plant ^{15}N .

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