

Interactive
Comment

Interactive comment on “Seasonal variation in nitrogen pools and $^{15}\text{N}/^{13}\text{C}$ natural abundances in different tissues of grassland plants” by L. Wang and J. K. Schjoerring

Anonymous Referee #2

Received and published: 17 February 2012

The aim of the presented work is to study nitrogen pools and carbon content in different grass tissues (stem, green leaves, inflorescences, senescent leaves and litter) in an objective to assess their seasonal variation in relation to ammonia exchange potential. The authors present and analyse a dataset of plant N pools as well as ^{15}N and ^{13}C ratios in the different plant tissues. Recent studies have shown that the ratio of total leaf tissue ammonium to H^+ concentrations (Gamma) can be used as a proxy for assessing the potential of a leaf to be a source or a sink of atmospheric ammonia. Total leaf tissue ammonium concentrations and pH are easier to measure than apoplastic ammonium concentrations and are therefore an interesting parameter to integrate into large scale modelling as the authors emphasize. Measurements of total leaf tissue ammonium and

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H⁺ concentrations for different plant tissues and on a whole year basis are still scarce in the literature and this dataset presents a valuable input for models. The paper is well laid out and easy to read. I only have some minor comments:

At the end of the introduction (page 12321 lines 11 to 14). It is stated that intensive measurements of NH₃ fluxes were carried out at several sites. How is the work presented in this paper related to those measurements? Were such measurements carried out at this specific site? If so why they are not cited or discussed in relation to the present work? If no such measurements were done then this sentence should be removed.

In the discussion section (page 12330 lines 25 to 29). It is stated that the peak values in gamma for green and senescent leaves coincided which indicates that the green leaves recaptured the NH₃ released by senescent leaves or litter. Are there any other indications for this? If not then I would rather put it as a hypothesis rather than state it as a clear fact. Can this be verified or at least backed up by an interpretation of the measurements of 15N ratios?

In general I find that the paper lacks a discussion part relating the different measurements. It is clear why NH₄⁺ and H⁺ measurements were done and why the ratios of 15N and 13C were measured. However, can for example the 15N ratios in the different plant tissues help us interpreting the seasonal variation of gamma values or do they give us more information on the source of this NH₄⁺ (recapture of atmospheric NH₃, mobilized N for other leaf tissues, N absorbed via the roots, . . .)? How do those measurements help us in better understanding what are the drivers for plant-atmosphere exchange of NH₃?

Furthermore, I do not see why chlorophyll content measurements were done. I would suggest removing this part.

Specific comments:

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- Page 12318 line 26 remove “as”
- Page 12320 line 24 “... turnover at the annual scale ...”
- Page 12321 line 22 “...according to their relative ...”
- Page 12322 line 2 replace occasions by dates
- Page 12322 line 16 “... materials by the use of methanol.”
- Page 12323 line 18 “... of both years...”
- Page 12325 line 19 “Fig 6a”
- Page 12325 line 24 Fig 4a
- Page 12326 line 2 Fig 7a
- Page 12326 line 10 Fig 7b
- Page 12326 line 13 remove “their”
- Page 12327 line 5 replace temperate by temperature
- Page 12328 line 12 “Plants sampled during ...”
- Page 12329 line 14 remove “down”
- Page 12330 line 13 “...are clearly sinks ...”
- Page 12331 line 13 remove “values”
- Page 12331 line 18 “...also supported by the fact that their total ...”
- Page 12332 line 14 “... shows that other factors than ...”
- Page 12345 caption of Figure refers to letters and arrows which are not represented on the figure
- Page 12347 Figure 4a and b the 2 y-axis titles (left and right) are different although

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the axes are the same

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