

Interactive comment on “Nitrogen enrichment enhances the dominance of grasses over forbs in a temperate steppe ecosystem” by L. Song et al.

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This is a nice study that expands the range of ecosystems that have been identified as sensitive to nitrogen pollution to temperate steppe grasslands in Asia, which are highly important for agriculture. The experiment is well-constructed, the findings are sound, and the writing is excellent. I have no major comments, but many small suggestions for improvement that are listed below.

Page 5058, line:

- 5. temperate, not temperature
- 19. change to ‘deposition-induced’

C1951

20. N dynamics may be very important, but may not be ‘key’. Climate (and in some cases management) probably plays a more important role.

Page 5059, line:

- 3. I’m not sure if we can really say how ‘rapid’ or not these changes will be.
- 4-6. ‘A decrease in biodiversity. . .community.’ This statement is very sweeping and in many case not justified, unless we take a very broad definition of ‘decrease in biodiversity’ (e.g. habitat destruction)
- 7. change ‘enlarge’ to ‘enhance’
- 9-13. I believe the largest effect shown on species richness, together with the largest decline in pH, was with $(\text{NH}_4)_2 \text{SO}_4$, supporting the importance of pH
- 11. delete ‘famous’, capitalise ‘Grass’
- 13. change ‘confirmed’ to ‘showed’
- 14-15. You have to be careful here. Gradient studies such as these (1) describe long-term patterns, and (2) cannot tell us unequivocally what the causal factors are. It is more correct to rephrase this as: ‘each additional increment in long-term N deposition of approximately 2.5 kg N/ha/y is associated with a reduction in species richness of one species.’
- 20. add ‘slowly’ or ‘partially’ before ‘reversible’, as I don’t think complete reversibility was shown.
- 27. delete ‘supply’ after ‘nutrient’. Have these studies shown that N is limiting? Have they looked at the importance of P?

Page 5060, line:

- 1. ‘Their results. . .’ Based on what?
- 5. Does this mean that above 105 kg N/ha/y applied over 4 years, there was no signif-

C1952

ificant change? How much higher were the doses above this?

5-6. Delete 'However' from start of sentence. Change to 'The effect of N deposition on communities is modified by other factors. . .'

13. change 'reveal' to 'investigate'

16-18. change to 'The objectives of this study were to (1) test how different functional . . . , and (2) elucidate the role of. . .'

Page 5061, line:

19, change to ' to study the recovery from high N addition. . .'

23-24. End the sentence after 'non-destructively.' Delete 'because. . .N addition.'

26. delete '(20-25 August)'

Page 5062, line:

5-8. Were mean values of cover and species richness then calculated from the 5 replicate quadrats?

18. 'oven-dried'

25. 'within 12 h. ' This is not clear. Was this extraction made on a previously frozen sample? This is implied from the previous sentence.

Page 5063, line:

6-8. were assumptions of normality checked?

17. change 'stimulated' to 'increased'

21. delete 'gradient'

24. add 'experimental' after 'moderate'. These levels are not at all 'moderate' in nature.

Page 5064, line:

C1953

11. add 'any' before 'further'.

24. add 'partial' before 'recovery'

Page 5065, line:

21. change 'herbage' to 'vegetation'

25. change to 'functional' groups

Page 5066, line:

4. start a new paragraph after 'treatments'.

5. change 'enhanced by' to 'enhanced in'

12. start a new paragraph at sentence beginning 'The amounts of N. . .

15. add comma: 'N addition, in particular. . .'

Page 5067, line:

16. spelling: 'declined'

Page 5068, line:

2. change to 'N-enriched'

7-9. 'No further. . .of the study.' This sentence is unclear.

17,19. You are talking about a 'critical load' here. A critical level is a concentration.

19-21. In general, newer research shows these loads to be lower – it would be better to refer to the 2010 'Review and Revision of Critical Loads' document (R. Bobbink and J-P Hettelingh eds.)

Page 5069, line:

9-11. did you measure any pH change?

C1954

16. explain what Carroll et al. did.

27-28. elaborate – what do you mean by the ‘source’ of N?

Page 5070, line:

24. add ‘incipient’ before ‘soil N saturation’

27. change to ‘N-saturated conditions’

Page 5071, line:

1-3. So, is nutrient imbalance (rather than competition or pH) your explanation for the observed changes in your experiment? Have you looked at nutrient ratios in the vegetation to test this?

3. ‘deposition-induced’

10-11. How do you know that plants increased their N assimilation?

12. ‘changes in soil N sources’. Can you be more specific?

Figure 4D: change y-axis label from ‘Grasses’ to ‘Forbs’

Figure 5. These data would be better modelled as an asymptotic relationship rather than a straight line.

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