



SDI Review Form 1.6

PART 1:

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| Journal Name: | <u>International Journal of Plant & Soil Science</u> |
| Manuscript Number: | 2013_ IJPSS 4233 |
| Title of the Manuscript: | Role of soil nitrogen for the conifers of the boreal forest: a critical review |
| Type of the Article | Review Paper |

General guideline for Peer Review process is available in this link:

(<http://www.sciencedomain.org/page.php?id=sdi-general-editorial-policy#Peer-Review-Guideline>)

- This form has total 7 parts. Kindly note that you should use all the parts of this review form.



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PART 2: Review Comments

| | Reviewer's comment | Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here) |
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| <u>Compulsory</u> REVISION comments | <p>Conifers dominate the circumpolar boreal forests. In this paper, Lupi et al. review the importance of a significant limiting variable on ecosystem productivity, namely soil nitrogen supply, and in the process describe the relationship between conifer performance from the perspective of plant nutrition and recent increases in disturbance, especially N deposition. They also discuss some of the methodological and inferential limitations of previous studies of soil N – vegetation interactions in boreal forests and provide suggestions for future research.</p> <p>I found this paper to be well organized and comprising a great deal of interesting information pertaining to plant physiology and ecology in the boreal forest. Whereas much of this information has been reviewed elsewhere, one very valuable</p> | <p>We are very grateful to both of the reviewers for spending so much of their time on our manuscript. We are to hear that both the reviewers agree that the article is interesting and appropriate for publication in “International Journal of Plant and Soil Science”, after some revisions. We have gone through each of the comments from the reviewers and have presented below our responses. The modifications are highlighted in yellow in the new version of the manuscript. Some paragraphs and sentences of the old manuscripts were completely suppressed in order to address specific advices to reduce the complexity of the review. The lines and paragraphs suppressed are indicated referring to the original version of the manuscript.</p> <p>Lupi et al. responses to Reviewer KK_MA</p> |



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| | <p>contribution of the paper, however, pertains to the increasingly relevant issue of atmospheric N deposition. The authors touch upon the mechanism of canopy N uptake and the role of tree lichens in scavenging atmospheric N.</p> <p>In this context it would have been useful to address the broader issue of N pollution (which at least in Europe this issue pertains to) in making note of other aspects of atmospheric chemistry which usually accompany increased N deposition (e.g., changes in precip pH, increased S deposition etc).</p> <p>Another aspect of increases in N deposition omitted in this review pertains to changes in soil N composition. Given the apparent variable physiological capacities exhibited by boreal conifers to absorb different species of N (as covered in this review), it would seem relevant to visit more broadly the consequences of changing soil N composition on plant nutrition and plant performance.</p> | <p>The manuscript has been revised in order to add some discussion on the broader issue of N pollution making note of the aspect suggested by the reviewer. In particular, see lines 407-411 of the new manuscript.</p> <p>See lines 407-411 Some aspects of changes in soil N composition with increases in N deposition are also addressed at lines 633-642, 653-656 and 681-684 of the new manuscript.</p> <p>The links between soil N composition and plant nutrition and performance is discussed across the review. In particular in section 2 (Strategies for N-uptake), 3 (N metabolism and uses) and 5.3 (N uses in conifers) and the last paragraph of section 5.4 (Disturbances, N-depositions and stand development: implications for N cycling).</p> |
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| | <p>Moreover, such considerations should also have motivated some discussion of climate change, the magnitude of which is especially being felt in boreal (and arctic) ecosystems. In this context I was disappointed in the absence of any discussion of changes in fire regimes and the sustainability of conifer forests. There is a rather substantial body of research, from detailed physiological experiments on individual plant roots to spatially explicit modeling scenarios of entire landscapes, which singly and in combination, provide much food for thought regarding plausible trajectories in the boreal forest. Much of the conclusions drawn from these studies can be traced back to the relationship between conifers and the shifting soil N supply. Thus, I feel this paper unfortunately missed out on a great opportunity to examine the relationship between evolved traits pertaining to growth and resource acquisition in the context of rapidly changing environmental conditions. If such considerations could be incorporated in a revised review, I think the contribution of all the other interesting facets of this paper would be much enhanced.</p> | <p>Some discussion of climate change and changes in fire regimes was added in section 4.2 (Forest harvesting, fire and climate change: the impact of different anthropic and natural disturbances on the N cycle). In particular lines 466-495 on how fire and harvesting impact N cycle and lines 496-520 on climate change and associated changes in fire regimes.</p> |
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| <p>Minor REVISION comments</p> | <p>Abstract: 3rd sentence regarding “reduced availability of N (especially organic N)” – this caveat doesn’t make sense in this context.</p> <p>The juxtaposition of the last two sentences in Abstract represents a non sequitur. Revise.</p> <p>Table 2 need better balance of characteristics for</p> | <p>The abstract has been revised according to changes to the manuscript. The caveat “(especially organic N)” has been deleted. Now the sentence is “Boreal conifers have adapted strategies to cope with the reduced availability of N.”.</p> <p>The last two sentences in Abstract were deleted and another part added. The part added at the end of the abstract is now “Climate change should affect the N cycle through complex mechanisms, including changes in the fire return interval, direct effects of warmer soils on N mineralization and stimulating plant growth modifying the balance between N stored in soils and in the living and dead (e.g. wood) biomass. Future research should try to improve our understanding of the possible outcomes of changes in disturbance regimes, N-depositions and climate, including the role of N fixation by mosses, canopy N uptake and the responses of conifers in relation to changes in microbial (symbiotic and not) communities.”.</p> <p>Table 2 has been re-organized in horizontal</p> |
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| | AA, NH ₄ and NO ₃ . The way the table is organized does not lend itself to clear comparisons among N species. Please reorganize. | layout, to try to improve the ease of comparison among N species. |
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| <p><u>Optional/General</u> comments</p> | | <p>The review article has been subjected to major revisions. Some paragraphs and sentences of the previous version of the manuscript have been removed in order to follow an advice by one of the reviewers and better focus the new manuscript, leaving more space to treat more in detail other issues.</p> <p>Some figures (Figure 3, 4 and 5, of the old manuscript) were also deleted, since the section in which they were included (Section 3, N metabolism and uses) was much reduced in the new version of the manuscript and the text was clear enough without additional figures.</p> <p>The abstract has been partly rewritten accordingly.</p> <p>Some references were added, where needed, following suggestions by reviewers.</p> <p>The modified text is highlighted in yellow.</p> <p>Major phrases / paragraphs deleted, with reference to the lines of the old manuscript:</p> <p>Lines 125-131 (from “through an H⁺-ATPase...” to “NO₃⁻ efflux seems to be a passive process, probably through anion channels, but knowledge is still scarce.)</p> <p>Lines 138-142 (from “NH₄⁺ nutrition</p> |
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| | | <p>negatively affects the NO₃- uptake..." to "NH₄⁺ uptake is reduces at high soil and cytosolic NH₄⁺ concentrations.")</p> <p>Lines 234-243 (from "In a long-term experiment with mature Norway spruce trees..." to "...and for root elongation in response to NO₃- under NO₃- deficiency.")</p> <p>Lines 290-295 (from "However, the characteristics that probably confers the most competitive..." to "...with values attaining 0.8 t C ha⁻¹ yr⁻¹.")</p> <p>Lines 304-313 (from "A strategy that could reduce the competitive pressure and enhance conifer nutrition..." to "...in the horizons dominated by ECM fungi.")</p> <p>Lines 353-379 (all the "3.1 N assimilation" section has been deleted)</p> <p>Lines 382-397 (from "The most common amino acids extracted..." to "...have been observed in Scots pine and white spruce.")</p> <p>Lines 399-405 (from "Glutamine and glutamate concentrations..." to "...which makes it more sensitive to artificial</p> |
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| | | <p>defoliation of 1-yr old needles.”)</p> <p>Lines 411-413 (from “Seedlings can show both predetermined...” to “...sustaining a second flush of growth.”)</p> <p>Lines 418-424 (from “3.3 N, photosynthesis and growth...” to “...that Rubisco may act as N store during winter.”)</p> <p>Lines 427-432 (from “The slope of the photosynthesis-leaf N relationship...” to “...to the different leaf structure between conifers and angiosperms.”)</p> <p>Lines 434-438 (from “Fertilized Norway spruce showed..” to “...but WUE similar to that of the control”)</p> <p>Lines 451-455 (from “When foliar mass was taken into account...” to “...the biochemical role of proteins in photosynthesis.”)</p> <p>Lines 471-477 (from “N-addition can generate shorter tracheids in wood...” to “...the responses could vary with site because of the different soil and N-availability.”)</p> |
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| | | <p>Lines 478-486 (from “Changes in wood chemistry...” to “...implications on wood decomposition and industrial utilization.”)</p> <p>Lines 507-510 (from “On the basis of a wide European growth dataset...” to “...due to its high C:N ratio.”)</p> <p>Lines 538-540 (from “However, root longevity was lower...” to “...an interaction between temperature and fertilization.”)</p> <p>Lines 685-686 (the sentence “So, it is proposed that late-successional conifers have slow growth because they rely on less available organic N sources.”)</p> <p>Lines 716-721 (from “Moreover, as succession proceeds...” to “...to follow isotopes through the ecosystem and within trees over several years following N addition.”)</p> |
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