



EGUsphere, author comment AC3
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Reply on EC1

Chelsea K. Janke and Michael J. Bell

Author comment on "Impact of contrasting fertilizer technologies on N dynamics from subsurface bands of "pure" or blended fertilizer applications" by Chelsea K. Janke and Michael J. Bell, EGU sphere, <https://doi.org/10.5194/egusphere-2022-511-AC3>, 2023

We thank the Reviewers and Editor for their valuable feedback and consideration of our manuscript for publication in *SOIL*. Specific responses to comments from the Editor are below. A full response to all Reviewers and the Editor is attached as a supplement to this response. This file includes the example figures mentioned in a response below.

The present study does not particularly report on a particularly novel topic, i.e. comparison of N-release of several slow-release N-fertilizers, but it does distinguish itself in the robust way how this was done in practice. Much due attention has gone into assessing the spatial distribution of mineral N-release surrounding the centrally inserted N-fertilizer with a custom-developed soil sampling scheme. The study also has merit in that next to just measuring mineral N-build-up also urea-N concentrations were simultaneously monitored and NH₃-concentrations were predicted from pH and NH₄⁺ levels. The topic is very well introduced and description of the applied methods is clear and complete.

The data presentation of EC and pH changes in 'heat maps' is appealing, but presentation of 'N'-data is less efficient. The presentation of NH₃-aq, urea-N, and NH₄⁺ and NO₃⁻ is less clear. For example, perhaps 3D graphs with vertical axis concentration, horizontal-axis time and the 'depth'-axis distance from ferosphere would be clearer. Results of statistical comparison between treatments or time are also best presented in these graphs.

>> We believe the current presentation of the data is in the simplest format for identifying trends via quick visual comparisons of treatments and N species. We attempted to graph data as suggested by the Editor and found it difficult to interpret (figures in attached supplement file). Nonetheless, we have put together two examples of what 3D figures for N species could look like. In one example, we have both NH₄⁺ and NO₃⁻ in the same figure. In the other, we separate the two N species, as suggested in prior comments by Reviewer 2. In the examples, data for the urea treatment only is shown. These individual figures would need to be re-drawn and presented for each treatment. Whilst the figures are more visually engaging and do allow trends to be seen, identifying exact values of N specie concentration is difficult. Further, it's unclear how the presentation of data in this format improves the ability to present statistical comparisons. In fact, in the current figures, SD bars have been omitted as the graphs become overly complex and overlap between 'series' obscures some of the data. We're happy to further discuss data

presentation with the Editor as necessary.

The interpretation of the provided wealth of data was very well made, but sections 3.4-3.6 and the conclusion are lengthy and deviate regularly from the actually carried out measurements (see comments below).

>> As mentioned in responses to Reviewer comments, much of the manuscript, especially in the Discussion sections, will be condensed with focus primarily on measurements conducted as part of this study, and their direct implications.

Two comments were posted, one by an anonymous referee (RC) and another public one (CC). Both are positive in their assessment, but nevertheless they raise relevant points which the authors need to consider before the manuscript is to be accepted. A response needs to be given to both RC and CC comments. Clearly indicate where you disagree with proposed changes to the manuscript.

I agree with the RC, that it is indeed particularly relevant to provide further reflection on potential NH₃-volatilization losses for the various treatment x soil combinations. Also adding in a basic mineral N-balance could be informative.

>> As noted in response to Reviewer 1, a N mass-balance table for all treatments will be provided in the revised manuscript and will facilitate discussion on potential losses, including NH₃ volatilization.

In the public CC comment other valuable points are made: section 3.4 is a really interesting read, but it is not entirely informed by your study. A good effort needs to be made to shorten such text parts in 3.4, while at the same time in the CC some valuable advises to alternatively build this section are given.

>> Response to comments from Reviewer 2 are noted above.

I also agree that 3.5 is best omitted entirely, though you may want to recycle the main message in 1-2 sentences elsewhere.

>> To condense and focus the manuscript, section 3.5 will be removed. Although, some of the key messages may be included in relevant sections elsewhere.

Lastly some suggestions are given to shorten 3.6 as well as the conclusion section – these need to be taken into consideration.

>> See above responses.

Some extra minor comment:

L12-14 Lengthy sentence best split + strange to use Laboratory incubations as subject here

>> As indicated in earlier responses, the manuscript will be reviewed in its entirety to ensure that sentences are not too lengthy and / or complex.

L19 define 'CRFs'

>> The definition will be added into the text here.

L21 'the greater impedance of solutes' will certainly not be clear to readers. Look for a more accesible explanation

>> This explanation will be simplified to something like, 'reduced solute transport' or similar.

L73 'In the instance of poor early-season N supply ...' do try to come to a less complex formulation of your message here.

>> This will be simplified.

L104 should be 'cm⁻³'

>> This will be corrected.

L176 seems rather bold to assume that N-immobilization was limited. Solid phase sorption would be unimportant for mineral N as the KCl anyhow displaces any mineral N-species from the exchange complex. So just omit 'solid phase sorption was minimal and / or' from this sentence.

>> 'Solid phase sorption was minimal etc.' will be removed from this sentence.

L186 first time the interesting term 'fertosphere' is used, deserves some explanation for non-specialist readers.

>> The fertosphere is first mentioned at line 130, and a simple definition is given. This can be expanded to be somewhat more descriptive (e.g., 'the volume of soil within 10 mm of the fertilizer band').

The sort of 'disclaimer' given in L195-200 is a bit of a strange way to start a discussion here and is best moved towards the end of 3.

>> This brief discussion on the limitations (or context) of the research will be moved to the end of Section 3.

The quality of Fig. 5 & 6 – at least in the pdf-version – was very low, needs to be resolved

>> The original TIF files for these figures have excellent resolution. These can be re-exported from the graphical software, if necessary. Although we suspect the quality has been lost during condensing into PDF. We're happy to work with the editorial team on this, if the manuscript is accepted.

Please also note the supplement to this comment:

<https://egusphere.copernicus.org/preprints/2022/egusphere-2022-511/egusphere-2022-511-AC3-supplement.pdf>