**Reviewer #3 – Comments and responses**

L40 - This is common enough to not need an explanation. i.e. no need for abbreviation.

We want our work to be accessible to international audiences, and therefore do not want to make assumptions about knowledge of governmental acronyms.

L48 – Secale cereale

Corrected.

L50 - Avoid using first person pronouns.

To our knowledge, this journal does not specifically ban the use of first person pronouns. We believe it aids in readability in this instance.

L53 - This suggests several depths were sampled. If so, what was the extent? If not, please clarify that only 10-18 cm depth was sampled (rather than an increment.

We removed the word ‘increment’.

L63-64 Please rephrase. Something along the lines of "At two trials, soil water content at field capacity under CC management was 2.5 and 2.4% higher, respectively, compared with NC".

Changed.

L89 - Since this is the first Nichols et al., 2020 in the manuscript, shouldn't this be 2020a?

Yes, this citation was changed to 2020a and the references were updated accordingly.

L120 - Soil textural analysis will be a very good addition to the data. Although the soil series were identified, it is important to remember that the translocational and depositional processes can affect the current particle size distribution.

The average soil texture information for each location was added to the table.

L128 - This should be Nichols et al., 2020b

L128 - At what depths?

We changed the sentence to read:

*All sites had sub-surface drainage at approximately 1.2 m*

L130 - The map is not clear (the highlighted counties are very clear and it makes it difficult to understand what is going on here)

We eliminated the map from the manuscript and put it in supplementary material, and eliminated the county outlines on the map.

L139 - A brief explanation (before referring the readers to another publication for detailed explanation) will be helpful for readers.

We changed the text to the following:

*Cover crop biomass sampling occurred each spring at every trial by removing two or four aboveground biomass from an area of 0.25-0.36 m2 from each plot, depending on the trial; details about methodology are reported elsewhere (Nichols et al. 2020b).*

L145 - Please state how many days for clarity since this will be dependent on soil texture, among other things.

We added the following text:

*Two to four*

L149 - Why was this depth chosen and not any other depths?

Soil surface conditions play a huge role on water movement and retention. Why was the surface not sampled? It could provide important information.

This is explained in the introduction (L96-99). We reworded our objectives to better highlight the deeper depth as an explicit goal of this study (see below), but we do not think it is appropriate to repeat our logic in the materials and methods section.

*Given the need to quantify long-term benefits of cover cropping, the scarcity of Midwest-specific data at depths relevant to crop water-use, and lack of a framework for organizing relevant knowledge, the objectives of our study were to:*

*(1) Determine what aspects of a soil’s hydrological characteristics are affected by long-term cover cropping at a depth relevant to crop production, and whether those effects are consistent across sites.*

*(2) Use our findings to propose a causal model connecting CCs to changes in soil properties to aid in targeting future research.*

L158 – 159 - Not really important. Please delete.

We believe this information is important for understanding how the statistical models were chosen, and other reviewers requested information be added to this sentence, implying they found it pertinent. We therefore left the text.

L170-171 - Please be careful here. The method in the cited study is for the determination of bulk density in forest soils (this study was not conducted on forest soils so this citation is not accurate). Please use this statement and citation instead "Soil bulk density was analyzed using the core method (Grossman and Reinsch, 2002)".

Grossman, R. B.,& Reinsch, T. G. (2002). Bulk density and linear extensibility.

In J. H. Dane & G. C. Topp (Eds.), *Methods of soil analysis:*

*Part 4, physical methods* (pp. 201–228). SSSA. https://doi.org/

10.2136/sssabookser5.4.c9

The reference was changed.

L175 - This does not need to be a stand-alone subsection. Just mention the method used for the analysis with the citation and include it in the subsection just above this. Further, the percentages need to be presented (either in a new table or added to the current Table 1)

We combined the soil texture and organic carbon sections into one. The texture information was added to Table 1.

L181 - See comment above for soil textural analysis. Just state the method and citation. This will enhance brevity.

See above.

L187 - "Analysis" is a better term.

Changed.

L198 - Biologically meaningful? What does this mean?

This sentence was deleted.

L218 - It also depends on other soil intrinsic factors.

We agree, however the majority of studies assume -330 cmH2O which ignores ALL other factors. In areas with shallow water tables, such as Iowa, the depth to the water table is one of the main considerations determining the matric potential at field capacity. We provide citations supporting our choice. If there is a particular factor the reviewer thinks we need to consider in addition to the water table, we are happy to consider it.

L220 - Higher matric potentials

Based on previous feedback, we believe ‘less negative’ avoids the confusion that results from a lower absolute value also being a higher numeric value.

L220 - These values are not assumed. They are measured values in most cases. Please be careful here.

We provide citations supporting our decision to use -100 cmH2O.

L222 - Please be careful here too. It is a leap to go from -33 kPa soil water pressures not being an accurate measure of field capacity to -10 kPa being a better approximation. It is not supported by data. I suggest removing this sentence. The sentence before this is enough justification

We do not understand this suggestion. We believe we provide sufficient justification.

L236 - This should have been added to Table 1 rather than having it in the form of a figure. Also, this figure does not tell the reader anything about the depths.

We added the texture data to Table 1.

Also, this is presented in such a way that makes it seem like the CCs had any effects on the soil texture. This is not true.

The reviewer is mistaken – cover cropped plots had higher sand components than the no-cover plots at two of the trials, as described in L235-245. We do not imply the cover cropping caused different soil textures. We hope removing the figure will allow the reader to concentrate on the text description, and de-emphasize this component of the analysis.

L258 - It was just not significant. This will enhance brevity.

The problem is it was significant, both with and without a sand co-variate. Stating it was not significant would not be true, although we realize it is a confusing result. Wording was changed in response to another reviewer’s suggestions.

L267 - Why measure water content at different pressures and not present the moisture retention curve.

We moved the retention curve figure to the beginning of this section so it is the first figure the reader sees.

That is a better way of presenting this data rather than the current table.

We believe the reviewer is referring to the figure, not a table. We changed it to a bar graph so it is easier to interpret, and moved it after the water retention curve.

L282 - This sentence suggests that you need to cite more than one reference here)

We reworded it to make it clear we are only aware of one study:

*To our knowledge there are limited studies examining the potential for CCs to reduce flood damage in the Midwest, but the one we are aware of accounts for only the increased evapo-transipiration with the use of CCs (Antolini et al., 2020).*

L284 - Why was it higher? Any causal mechanism?

We added text to indicate causal mechanisms are discussed later in the paper

L284 - 2% is just fine (delete the 'vol')

We found people were confused if the field capacity increased by 2% of the original value (i.e. they thought it increased 2% *of* 35%). To avoid that confusion we added vol% to all mentions to make it clear it is an absolute increase, not a relative increase.

L318 - How does below-ground biomass measurement get into your model if it wasn't measured in the first place?

The causal model is designed to help identify measurements that need to be taken. We realize the word ‘model’ may be confusing, as we also used statistical models.