

## ***Interactive comment on “Soil biochemical properties after six years in amended brown and gray mine soils in West Virginia” by C. Thomas et al.***

**C. Thomas et al.**

jskousen@wvu.edu

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1. Reviewer wonders if title should be more explicit than the term "amended."

Reply: I agree, and therefore have changed the title to Soil Biochemical Properties in Brown and Gray Mine Soils With and Without Hydroseeding

2. Reviewer asks if a brief statement about the differences in these two materials is warranted.

Reply: I agree again, and therefore have added the following to the introduction.

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"The brown sandstone substitute materials have a pH from 4.5 to 5.5 compared to the gray sandstone materials with a pH of 7.5 to 8.0 (Wilson-Kokes et al., 2013b). These low pH conditions are more conducive to tree growth, while the higher pH is better for many seeded grasses (Zipper et al., 2013). Both soils tend to contain high levels of rock fragments, which translates into poor water-holding capacity and poor nutrient relations in these topsoil substitutes (Haering et al., 2004).

3. Add soil texture and rock fragments.

Reply: I agree, and put in the following, "with soil textures of silt loam and sandy loam (15 to 25% rock fragments) ..."

4. Reviewer cautioned us against pseudo-replication.

Reply: We were careful to randomly place 13 transects across the site so that we would sample the plots in a way that would reflect the conditions represented on the site.

5. Lack of baseline data or even a reference point is a drawback.

Reply: Yes, I agree that biochemical measurements over time would have been the best way to conduct this study. Nevertheless, the fact that we have untreated brown and gray mine soils, and these same mine soils treated with and without hydroseeding is the data comparison we had for this study.

6. Coal that has been weathered can be thermally oxidized along with soil organic matter, underestimating Coal-C and overestimating soil organic C.

Reply: We agree that this is a concern. The temperatures selected for burning our samples (950 and 350) are well-known temperatures that are used to operationally separate carbon into these different fractions. It is also well-known that these temperatures are not strict boundaries where no coal carbon burns at 340 degree or less, and that all soil organic carbon is burned at 340 degrees. Because of the carbonate and coal fractions, we attempted to eliminate those fractions and not consider them as organic C in our calculations. It is also true that the weathered soils may have altered the

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burning temperatures for coal. Nevertheless, our study is unique in that we removed the interference of carbonates and coal C for our soil organic carbon interpretations.

7. If followed procedure closely, no need to give detailed steps if cited procedure. Just when modifications to procedure were done.

Reply: We feel that this description is necessary for the reader to be clear on our methods. Therefore, we don't want to remove it.

8. What type of mean separation test was run?

Reply: This was an oversight and we have added another sentence, "Treatment means when found significantly different by analysis of variance were separated by Tukey's Honest Significant Difference test at the  $p < 0.05$  level."

9. What about coal N? Coal-C was discussed, but not Coal-N?

Reply: We measured coal N and it was consistently about 5% of the Total N. Therefore, we didn't include it in the table, but did include a statement in the text "and coal N was about 5% of the total N (data not shown)."

10. Brown mine soil was significantly lower when compared to gray and brown mine soil with hydro seeding. Pooling of results is not appropriate here. Perhaps, the brown mine soil with no hydroseeding resulted in the lowest MBC because of having lower pH and rhizosphere exudates.

Reply: The reviewer is correct and I have already changed this section with the first reviewer's comment.

11. More discussion on how hydroseeding (specifically, species populations) affects C and N cycling is needed, since they are coupled cycles.

Reply: We didn't elucidate or expand the discussion on the effects of particular species on C and N cycling (like legumes) because the legumes were a very small part of the total low herbaceous cover. I think the species are less important than the original

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fertilizer that was applied to enhance growth of herbaceous plants.

12. Actual plant species populations in 2012 are needed.

Reply: We did not measure the percent cover of each species in our quadrats, but again, in hindsight, it would have been helpful.

13. Define "fines", assuming its less than 2 mm sieved soil.

Reply: Agree, so added a footnote in Table 5.

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Interactive comment on SOIL Discuss., 2, 675, 2015.

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