

Interactive comment on “Assessing winter cover crop nutrient uptake efficiency using a water quality simulation model” by I.-Y. Yeo et al.

Anonymous Referee #2

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General:

This is an interesting modeling study focused on evaluating the effectiveness of different cover crops (wheat, rye, barley) and planting deadlines (early/late) for controlling nitrate loading using a process based watershed model. I believe that the study has potential practical application in the area of sustainable nutrient management, and subject is also well within the scope of the journal. However, there are many details missing in the methodology section and in the interpretation of the results, and need to be clarified in order for the study to be considered for publication.

Comments:

1) What are the criteria for assigning crops in rotation to the modeling unit (HRU)?

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I am anticipating that the authors assigned corn-soybean and soybean-corn rotations to corn and soybean pixels of 2008 land cover data, respectively. However, I am not sure about this as there is no information provided in the methods section about how the rotations were assigned to the modeling units. The spatial location of each crop in the rotation would have enormous impact on total nitrate loading because of the variability in the underlying soil characteristics and climate conditions across the space. Therefore the placement of rotations is critical in determining reliable estimates of total nitrate loading in different scenarios.

2) What are the different management practices used in the study?

Again, important pieces of information are missing in the methods section. These include 1) whether irrigation was applied or not under rotation systems 2) what type of tillage (conventional or no-till) was practiced under rotations. These two operations significantly influence the total runoff to the streams. In addition, I did not find what management practices (e.g. tillage, fertilizer application, pesticide use) are assumed for the cultivation of cover crops.

3) The interesting finding in this modeling study is that winter cover crops have a negligible impact on water budget with relative to the baseline scenario. I am wondering whether there are field studies supporting this finding. There should be a discussion on what factors allowed this practice to store the soil water equally to the baseline scenario in which land is fallowed during winter. Conventionally, croplands are fallowed in the winter season to store the soil water so that there will be enough available soil water for the next growing season.

4) P. 14238, Ln. 18-19: Information should be provided here on how you assigned cover crops to the croplands when you increased the implementation area. Are they just randomly assigned? As mentioned above, placement is a very important factor. When we assign cover crops close to streams, nitrate loading could be different than when we assign cover crops far from streams.

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5) What is the spatial resolution of HRUs?

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