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Interactive comment on "Effects of fresh and aged biochars from pyrolysis and hydrothermal carbonization on nutrient sorption in agricultural soils" *by* M. Gronwald et al.

Anonymous Referee #2

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Review of the paper 'Effects of fresh and aged biochars from pyrolysis and hydrothermal carbonization on nutrient sorption in agricultural soils' by Gronwald et al.

The paper reports a very detailed study on the N and P sorption potential of pyrochars and hydrochars from different feed stocks for two soils. The authors apprehend the sorption potential of fresh chars produced by different procedures from the same feedstocks and also assess the development of the sorption potential in the laboratory after washing and after field ageing for seven month. Their data indicate differences between the different chars as well as for different nutrients and combinations between soils and chars. Feed stock has some influence on nutrient leaching and sorption. The

most important finding of this study is the fact, that the increased sorption capacity of biochar for nutrients was very short-lived and strongly reduced after the 7 months field exposure thereby questioning their efficiency to minimize nutrient leaching in temperate zone soils. In my opinion this result should be more put in the focus of the manuscript. At the moment this important result is somewhat diluted by laboratory experiments, which are not really related to this finding.

The study is timely and the data set presented sound and of interest for an international audience. I have some comments, which need to be addressed before the paper may become publishable in soil:

Terminology: 'biochar' is used as a term, which groups material produced by very different procedures (pyrolysis and hydrothermal carbonization). I would replace this term by just talking of chars when both types of materials are addressed. Biochar is by definition charcoal, which is produced by pyrolyses. I do not agree with the use of this term for material that was produced by hydrothermal carbonization because it confuses the reader.

The paper is very long and contains a lot of data. While nine chars, produced by different procedures from different feedstocks, were used for laboratory batch experiments, only chars produced from Miscanthus were used for field incubations. This is pointed out in 2.1, where the production procedures are described. This sentence should be moved to point 2.2, where the field experiments are described. In my opinion, the logic of the paper would benefit, if the authors concentrated either on the laboratory experiments or only on chars produced from Miscanthus feedstocks.

The main point of the paper, reduction of nutrient sorption, is seen in the field experiments, but not very evident, when looking at the obtained during the batch experiments. Here, chars from Miscanthus do show very little effects on nutrient removal. In general laboratory experiments should be carried out to elucidate processes, while field experiments are carried out to investigate behaviour under natural conditions. I rec-

ommend to report first the field data and then some selected data of the laboratory experiments designed to elucidated the processes and generalisation underlying the field observations (soil type, feedstock, washing).

In summary the authors should work on the story of their manuscript, the way that the readers are guided to be persuaded of the main important conclusions of their paper.

Interactive comment on SOIL Discuss., 2, 29, 2015.