

## ***Interactive comment on “Biochar increases plant available water in a sandy soil under an aerobic rice cropping system” by M. T. de Melo Carvalho et al.***

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Dear Referee #1:

Thanks for your remarks. Please find below our response to your suggestions and questions:

1 – the determination of bulk density was described on page 894, lines 11-12.

The equipment with which the SEM image was made: Scanning Electron Microscope (SEM), Jeol, JSM – 6610, equipped with EDS, Thermo scientific NSS Spectral Imaging. The samples were covered with a gold film before analysis with the equipment:

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Denton Vacuum, Desk V. The analysis was done at the Physics Institute of the Federal University of Goiás (Brazil): <http://labmic.ufg.br/pages/45686-microscopio-eletronico-de-varredura-mev>

2 – As we report on page 893, line 21, the initial properties of biochar and soil are presented in Petter et al. (2012). We relate the response of rice yield in the first seasons, reported by Petter et al. (2012), with the responses observed in our study (page 905, lines 3-5). We also compared the physical properties of the biochar we used (particle size, porosity and SSA) with others and discuss the influence of biochar type on soil water retention capacity (page 903, lines 15-20).

Regarding your question: 1 – This is a very interesting question, as there might well be an interaction between biochar type and soil. The aggregation structure of a clay soil is completely different from that of a sandy soil and this has clear implications for retention and water flow. As the current results show, biochar is able to modify the water retention capacity and this might also be the case in a clay soil. We are currently analysing the results of an experiment which we conducted on a clay soil and hope to be able to report on our findings in the next couple of months.

2 – We are convinced that temperature during pyrolysis will have an important influence on biochar characteristics. According to our literature review low temperature biochar has less pores than high temperature biochar (see page 890 lines 7-10) and therefore low temperature biochar might have a lower impact on water retention capacity of a sandy soil than a high temperature biochar. Surprisingly, information on important characteristics of biochar are not always included in papers that present the influence of biochar on soil properties and crop production. One of our main recommendations is therefore that physical and chemical properties of biochar should always be determined and reported (page 888, 21-23). For our experiments we did not chose the temperature, rather we chose a biochar which is readily available in the region where the field trial was conducted. We consider the availability of biochar to be an important factor for safeguarding the relevance of our study. For that rea-

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son we selected availability of biochar, rather than preparation temperature, as the criterion when testing biochar as soil amendment. More about designing biochar for water retention application can be found in Gray et al. (2014), Biomass and Bioenergy: <http://dx.doi.org/10.1016/j.biombioe.2013.12.010>

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Interactive comment on Solid Earth Discuss., 6, 887, 2014.