

MS soil-2015-53

Answer to Dr Rumpel topical editor

C Rumpel: you adequately addressed the few reviewer comments and I agree with the reviewers that the paper is in good shape and will be a valuable contribution to the SOIL journal. However, I have one last comment, which should be addressed, before the final manuscript can be published:

Answer: Many thanks for your positive reaction to our revised MS.

C Rumpel: you stated in the introduction, that the contrasting results obtained by different studies may be due to different methods used to determine P and organic P. However, you did not indicate the methods used for elemental determination in the different trials. If they were not the same, the contrasting results for the three study sites may be due to different methods used. As this is a crucial point, the methods should be mentioned.

Answer: This might be a misunderstanding: yes, in other studies, methodology might have been an issue. However, in our study, the same methods were used on all samples of the 3 trials for available P (resin extractable P from moist soil samples), microbial P (Kouno et al. 1995), microbial C and N (Vance et al. 1987), total C and N (combustion). Actually, we already mentioned in the text of the paper that the relevant methods are mentioned in the supplementary materials for the 3 trials.

Total P was analyzed after sample ashing in the DOK, as it gives similar results to alkaline fusion on these soil (Astrid Oberson personal information), in the Wagga Wagga samples, total P was measured after an attack with concentrated HClO₄ (Bünemann et al. 2008), and in the Saria samples, total P was measured after an attack with concentrated H₂SO₄ and H₂O₂ (see supplementary material). Although different methods were used for total P, we believe that they provide good approximation of the soil total P content, one of the many variables we look at.

Organic P could not be measured with the Saunders and Williams' method in the soil samples of the Saria trial. This is why we had to use the NaOH-EDTA extraction to assess P_o in these samples (see supplementary material). The Saunders and Williams' method was used in the soils of the two other sites (Wagga Wagga and DOK) (see supplementary material). The NaOH-EDTA extractable P_o had been also measured in Wagga Wagga (Bünemann et al 2008) and in the DOK (Keller et al. 2012), but contrarily to what we saw in Saria, the NaOH-EDTA P_o values were systematically lower than the Saunders and Williams values in the samples from Wagga Wagga and DOK (NaOH-EDTA P_o was about 2/3 of Saunders and Williams P_o in these samples). We chose to use the method that gave the highest results at each site. It should also be noted that the use of NaOH-ETDA extractable P_o values in each site does not change any of the conclusions of the paper.

Text added at the end of the end of section 5 (line 497 of the revised version):

Can the changes in soil nutrient ratios as affected by management seen in this paper be explained by the use of different methods for soil analyses? While the same methods were used to measure total C and N, microbial C and N, resin P, microbial P in each trial, soil organic P was measured after an extraction with NaOH-EDTA (Bowman and Moir, 1993) in the Saria samples while using the Saunders and Williams' method in the Wagga Wagga and the DOK samples (Saunders and Williams, 1955) (supplementary material). This choice was due to the fact that the Saunders and Williams' method gave extremely low values in the Saria samples (supplementary material). In the soils of the two other trials, the opposite results were obtained, as the Saunders and Williams' method provided larger estimates of soil organic P than the NaOH-EDTA (Bünemann et al., 2008; Keller et al., 2012). For this work, we chose to present the respective largest estimates of soil organic P. Although the use of NaOH-EDTA extractable Po instead of the Saunders and Williams estimate of Po changed the C:Po and N:Po ratios in the Wagga Wagga and the DOK trials, these changes did not change any of the conclusions presented in this paper.

C Rumpel: Moreover, it could be a good idea to re-organise the manuscript according to method description, where all sites are described together with the measurements and a result section, where all results are described.

Answer: Many thanks for this idea. However we prefer to leave the organization of the MS as it is because we are dealing with 3 totally different field experiments that include different treatments tested with different experimental designs. This is now explained in the introduction. We hope that our point of view is acceptable. We feel that reorganizing the MS would put a large burden on the readers to remember the details when reading the result and discussion sections.

Text added at the end of the introduction (line 127 of the revised version):

As we are dealing with three very different field trials, we present the respective descriptions, results and discussions successively, first for the Saria trial, then for the Wagga Wagga trial, and then for the DOK trial. After these trial-specific assessments, we compare and discuss results across trials.

The references cited in this answer are to be found in the reference lists of the main manuscript or of the supplementary material.