

Interactive comment on “Effect of land management on soil properties in flood irrigated citrus orchards in Eastern Spain” by A. Morugán-Coronado et al.

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(1) comments from Referees Anonymous Referee #2 Received and published: 30 January 2015 General comments The study makes a comparison between 3 different agricultural regimes practiced in flood irrigated citrus orchards in Eastern Spain, with the aim of assessing the effects of these different regimes on the soil properties, I think this aim has broadly been achieved. However, the paper is presently deficient in several areas and as such I would recommend several substantial changes prior to acceptance, these are listed below.

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Introduction The introduction doesn't talk about soil properties and how these are thought to be influenced by the land management they are subjected to, it talks extensively about the effects SOM has on the microbial activity that takes place in the soil; this should be condensed to allow the inclusion of more detail on the soil properties. **DONE** Introduction section was entirely rewritten with the suggestions made by both reviewers.

The paper would benefit from the inclusion of clear hypotheses, currently the aim is stated at the end of the introduction, hypotheses could be added here to give the paper more structure. **DONE** We included a paragraph with our hypothesis. According to different studies, we hypothesise that organic farming treatment applied in field experiment, could mean a significant improvement on soil physical, chemical and biological properties. **Methods** The sections on experimental design and soil sampling are somewhat contradictory making it unclear as to whether samples were collected from experimental plots all located on one farm (as suggested in lines 16 and 17 on page 5) or if they were collected from 3 different farms (as stated in lines 12 and 13 on page 6), this needs to be clarified. **DONE** We include this accurate explanation in experimental design section, were collected the soil samples from three experimental plots all located on one farm. "The three plots studied located on one farm at the Alcoleja Experimental Station have been planted with citrus"

Clarification is also needed as to whether the 3 different management types are subject to the same irrigation regime or do they vary according to decisions made by the farmer (lines 23 and 24, page 5). **DONE** Paragraph rewritten with this comments. All the three orchards of this study have been flood-irrigated with fresh water from the Sants River, which is a spring of the Macizo del Caroig aquifer. The spring supplies the discharge for the irrigation and is 2 Km from the experimental station. No pollution, no sources of OM and no wastewater is mixed with the high quality water coming from the spring. The three treatments of this study are flooded every 20 days in summer and no irrigation takes place in winter (700 m³ ha⁻¹ per irrigation) from April to October.

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Results Page 9 begins with the statement “The H plot did not show a great improvement in the fertility parameters”. Improvement is the wrong word here, samples were only taken and tested once, there is no change to measure as no data about the soil properties is reported from before the imposition of the management regime. This sentence should be changed to remove the word improvement DONE We removed the word improvement in this sentence. The H plot did not show differences in the fertility parameters (Table 1 and Figure 1).

Section 3.3 reports the bivariate correlation coefficients calculated for “the most important physicochemical and biochemical properties”– how was importance decided, why not just include all variables measured? DONE The whole PCA section was rewritten with the new PCA analysis with the suggestions of the referee #1, (a) sampling adequacy of individual and set variables by Kaiser-Meyer-Olkin measure (>0.5) and Bartlett’s test of sphericity(<0.05), (b) Variables with communality values <0.5 need to be removed (WHC was removed following this criterion), (c) The selection of main components regulated by the latent root criterion (eigenvalues > 1.0) and (d) Use of varimax rotation to do the classification of soil properties by component.

The separation of management practices on PC1 and PC2 is very clear; however the separation on PC1 and PC3 is less obvious. PC3 seems to separate the organically managed samples into two distinct groups, is there any reason for this? DONE We repeated the PCA analysis following the suggestion of reviewers, and PC3 was removed from results section (showed in figure 4 and table 4)

Why would urease activity be different in these two groups of samples? In order to make these differences statistically clear anovas should be carried out using PCs 1,2 and 3. DONE We repeated the PCA analysis following the suggestion of reviewers, and urease obtained different scores in PCA (showed in figure 4 and table 4)

Increase the font size for the axes legends to make them easier to read. The PCA bi-plots are of poor quality, they are almost illegible at 100% and are only useful when

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blown up to about 250% . This needs to be improved, make the plots bigger and increase the size of the font for the loadings labels as well as for the axes legends. DONE Figures and tables were enhanced following the author guidelines of SOIL journal.

Discussion Generally discussion of the difference in soil properties between different agricultural management types is lacking. The differences are acknowledged but there are few reasons offered for these. DONE The discussion section was rewritten taking account this accurate suggestion.

Lines 23 and 24 on page 11 talk about hypotheses being supported by the results obtained, however, as stated above, no hypotheses have been clearly stated. DONE We added a hypothesis in introduction section. According to different studies, we hypothesise that organic farming treatment applied in field experiment, could mean a significant improvement on soil physical, chemical and biological properties. Lines 12 – 14 on page 12 state that the soil managed organically is able to process labile organic components and protect stable organic fractions because it has been shown to have high soil organic matter, this is not a justified conclusion. DONE This conclusion was improved with other studies, the whole paragraph was rewritten.

The organically managed soil is the only one of the 3 that has substantial regular inputs of organic matter (the mulch added in January), the other two soils are specifically managed so as to keep weeds to a minimum meaning that there is little litter feeding into the system. This means that simply measuring the levels of SOM in each soil does not provide sufficient evidence to show that the soil under organic management is more capable of protecting stable organic matter fractions than either of the other two. Minor comments Line 24 page 2: should read on soil microbial instead of “in microbial soil” DONE Rewritten this sentence

Line 5 page 3: change agriculture to agricultural DONE The whole paragraph was rewritten suggested by reviewer #1

Line 14 page 3: change time to temporally This paragraph was removed suggested by

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reviewer #1

Line 21 page 4: think chemical farmers should be changed to something like conventional farmers This paragraph was removed suggested by reviewer #1

Line 12 page 10: enzymes not enzymes DONE

Please also note the supplement to this comment:

<http://www.soil-discuss.net/2/C49/2015/soild-2-C49-2015-supplement.pdf>

Interactive comment on SOIL Discuss., 2, 1, 2015.

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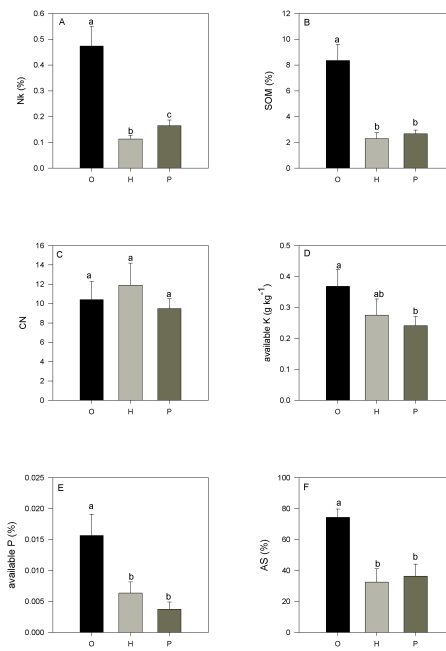


Fig. 1.

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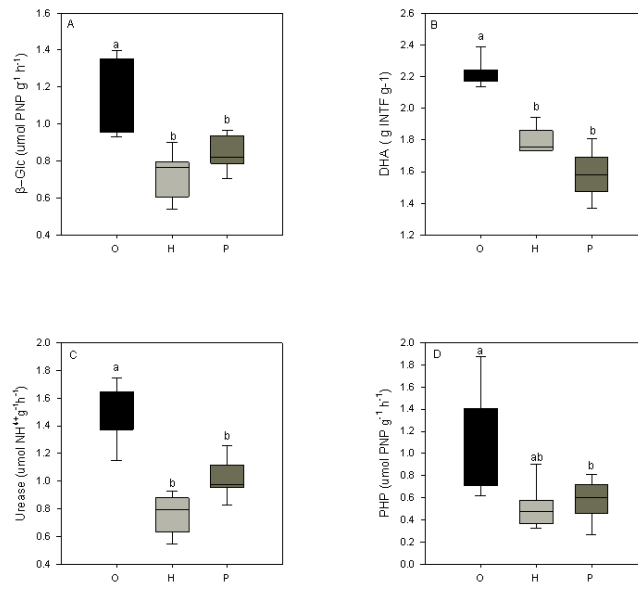


Fig. 2.

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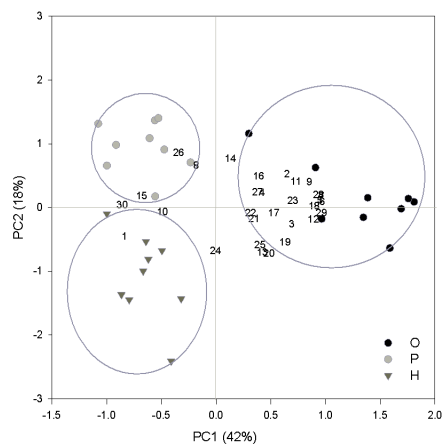


Fig. 3.

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