



EGUsphere, referee comment RC2  
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## **Comment on egusphere-2022-131**

Anonymous Referee #2

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Referee comment on "Effects of innovative long-term soil and crop management on topsoil properties of a Mediterranean soil based on detailed water retention curves" by Alaitz Aldaz-Lusarreta et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-131-RC2>, 2022

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General comments:

The purpose of the manuscript is a simple comparison of the influence of two management systems, conventional cropping and direct-drilling rain-fed cropping in the physical properties of a soil in the north of the Spain. The selected physical properties are the S index of Dexter (2004) and the size distribution of the stable aggregates. Neither the objectives nor the methods represent a new contribution to the fields of Agronomy or Soil Science.

Nevertheless, the relevance of reduced tillage systems for the Mediterranean countries, and the long duration of the field trials, deserve an opportunity for the authors after a thorough revision of the manuscript. Some recent contributions as, for instance, Or et al. (2021) could be inspiring for such a revision.

The Introduction section does not contain a comprehensive, updated perspective of the conservation agriculture and the quality of the soil. Consequently, the objectives, (lines 77-82) are very imprecise.

The Material and methods section is rather incomplete, with some inaccuracies that will be commented later. The climate properties of the study zone are missing. The description of the soil is limited the mention of the subgroup in the Soil Taxonomy scheme, the textural class of the upper soil horizon and Tables 1 and A1. No explanation is given in the text of the methods followed for the determination of the data of Table1. However, the details of the soil water retention in subsection 2.2 and of the aggregate size fractionation in subsection 2.4 are excessive including Figure 1.

The Results and discussion section is incomplete as well. The authors have chosen the van Genuchten soil water retention equation, but, in addition to the absence of the fitted values of its parameters in the text, one misses some consideration of other alternatives as, for instance, the multimodal equations, which according to Jensen et al. (2019), can reflect better the effects of management systems in the soil properties. I have expected some changes in properties like the bulk density, and the presence of some surface crusts, but, apparently, they were not found. The Figure 3 could not give an adequate information on the size distribution of the pores since it is estimated from the soil water retention curve through equation (2). The discussion of the results is fragmentary.

#### Specific comments

Line 18: instead of 'unit' it must be written subgroup.

Lines 25 and 26: 'significant differences' must be replaced by a statistic parameter.

Line 28: what is 'the studied depth'?

Lines 33-38: The paragraph should be rewritten to improve its comprehension.

Lines 45-47: The sentence is very similar to that of the lines 37-38.

Lines 51-53: The definition of the soil water retention is very imprecise. Why soil water retention 'is mainly associated with the porous system' 'at low suctions'?

Line 56: The treatment of the air entry state is, again, imprecise. The term 'so-called' is unnecessary.

Lines 67-70: This paragraph is unclear.

Lines 71 and 77: The two sentences are almost repeated.

Line 85: for the sake of precision write 'subgroup' instead 'type' and mention the Soil Taxonomy.

Line 86: The textural class should be silt loam, according to the particle size information of Table A1, where it was correctly indicated.

Lines 88-90: A more complete description of the soils should have been very helpful to understand their behavior. One cannot trust 'the visual inspection' to affirm that the soil is homogeneous. As in the line 28, could 'the study depth' be defined?

Line 105: The term 'coverer' is very odd.

Table 1: The evaluation method must be indicated in the text and the relevant details like the soil-water ratio for the suspension in the measurement of the pH and of the electrical conductivity.

Line 129: Use 'matric component of soil water potential' instead of 'hydic potential' to be more precise.

Lines 132-133: To establish the relationship between the gravimetric and volumetric water contents, one only need to know the bulk density of the soil. The sentence is confusing.

Lines 142-145: I could not find equation (1) in the article of Dexter (2004a). In fact, I cannot find the relation of this equation with the van Genuchten (1980) equation.

Lines 150-154: The equation was not proposed by Jurin (1718) as one can check reading such an article. Jurin described his observations in that contribution, but the equation was later formulated by Young and Laplace. This equation is usually known as the Young-Laplace equation (e.g. Adamson, 1967, § I.10).

Line 154: Is the (soil water) potential is mentioned, the sign should be negative. The term 'suction' is more appropriated here if the symbol 'h' has been used for the 'height' in the line 152.

Line 195: The term 'water capacity' was already defined, at least, by Arnold Klute in 1952.

Line 196: How 'field capacity' is defined in the text? This term must be precisely defined.

Table 2: as indicated above the soil water potential is negative.

Lines 231-233: If the authors are using a structural index, they should not compare the texture but the structure of the soil.

Line 306: The term 'capillary/available water' is misleading.

Line 322: I do not think that tillage should be 'suppressed'. The natural consolidation of the soil surface might be alleviated by occasional shallow tillage operations.

Technical corrections:

Line 54: Writing 'saturated' soil is enough.

Lines 146-147: The use of the acronym 'SUHC' is needless.

Lines 160 and 364: The correct name is Elliott.

Line 280: The Table reference is A1, not 'S1'.

Line 235 and caption of Figure 3: The proper adjective is logarithmic.

Incomplete references: Lines 366, 369-370, 373-374, 381, 387-388, 391, 407, 419.

The reference of lines 441-442 is not mentioned in the text.

References:

Adamson, A.W. 1967. Physical chemistry of surfaces. 2<sup>nd</sup> ed. Wiley-Interscience. New York.

Jensen, J.L., Schønning, P., Watts, C.W., Christensen, B.T., Munkholm, L.J. 2019. Soil water retention: Uni-modal models of pore-size distributions neglect impact of soil management. Soil Sci. Soc. Am. J. 83: 18-26.

Klute, A. 1952. A numerical method for solving the flow equation for water in unsaturated materials. Soil Sci. 73: 105-116.

Or, D., Keller, T., Schlesinger, W.H. 2021. Natural and managed soil structure: On the fragile scaffolding for soil functioning. Soil Till. Res. 208, 104912.