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Interactive comment on “The use of soil electrical resistivity to monitor plant and soil water relationships in vineyards” by L. Brillante et al.

L. Brillante et al.

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Reviewer 1

General Comments

I think that the long introduction related to “Plant and soil water relations in terroir” should be shortened, because it allows only to emphasize the importance of monitoring soil water status spatial/temporal variability.

This section has been added because the work has been submitted to a Special Issue,

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Interactive Discussion

Discussion Paper



having the title "Geosciences and wine: the environmental processes that regulate the terroir effect in space and time". Therefore the aim of the section is not only to emphasize the importance of monitoring soil water status spatio/temporal variability, but it tries to summarise the current understanding of the role of soil water in the terroir effect. This idea was previously discussed with the Editor of SOIL Journal and with the Editors of the current Special Issue. Editors expressly asked for enlarging the vision of the article because of the multidisciplinary editorial policy of the SOIL journal, and we proposed to write this first section. The Anonymous Referee #2, qualified this section as a "comprehensive and upto-date review of the soil-plant water relations in vineyards".

Anyway, reviewer 2 suggested to move a paragraph from this section to improve the very short introduction. This was the paragraph that more emphasized the subject of the work, and is better suited for the introduction. This had the double purpose of shortening and limiting the emphasis from the "Plant and soil water relations in terroir" section as you relevantly suggested.

As following suggested, I propose the Author to add a new paragraph as well as to clarify, for the readers benefit, some aspects of the research. Following, there are a few indication, some of which represent minor corrections, that should help Authors to improve the quality of the manuscript.

As we understand, you suggest the introduction of a new paragraph where Materials and Methods are better described. Such request was also suggested by Reviewer #3 and the paragraph has therefore been inserted.

Specific Comments

P.2 L.11 Probably it is better to say "ERT derived variations of the Fraction of Transpirable Soil Water (FTSW)"

Interactive
Comment

Full Screen / Esc

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Interactive Discussion

Discussion Paper



CORRECTED

P.2 L.12 I suggest to change “depending on” with “depend on”.

CORRECTED

P.4 L.27 Authors should precise on which soils “Water in macro and mesopores is generally more easily available to plants, but it is also more mobile, as it is not retained by capillary forces.”

PRECISED

P.9 L.8 Delete a parenthesis

CORRECTED

P.15 L.1 Change “more” with “most”

CORRECTED

P.15 L.13 Authors wrote that “However, the relationship between SW and ER appears linear only when considering a limited range of variations.” Is the range of variations related to both the variables? Please, clarify.

It is related to both variables. It has been specified.

P.16 L.5 To benefit the readers, some information of the model to predict the Fraction of Transpirable Soil Water should be provided.

They have been inserted in the material and methods section.

P.16 L.6 Authors show the maps of the variations of the FTSW in a vineyard soil, without providing any detail about the field dimensions, the period of measurement and other information (i.e. irrigation, rainfall, etc.) that could help the readers

SOIL

1, C535–C541, 2015

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



Interactive
Comment

to better understanding the methodology. It seems that the methodology is presented in other papers, but I suggest to insert a new paragraph in which, even shortly, the experimental setup is presented. Moreover, the soil characteristics should be anticipated in this new paragraph.

True. Following your previous request a paragraph presenting the experimental setup has been inserted and also include these informations. Note that the field dimension can be read on the x axis, which as the label indicates is expressed in meters. While the rainfall amount is given in the ombrothermic graphic in the same figure; the vineyard is not irrigated.

P. 16 L.7 Which measurements? At what time the measurements were carried out?

The sentence has been removed because of the insertion of the material and method section where this is explained with greater details.

P. 16 L.20 The sentence “Maps of the FTSW can at first sight be somewhat misleading, because the period of variation of all pixels is not equal” is not clear, probably because the lack of methodological info.

I agree with you the sentence has been reformulated and therefore substituted by these: “Maps of FTSW can at first sight be somewhat misleading, because even if all pixels are on the same scale (being FTSW a normalised variable) the numerical relationship between FTSW and ASW varies across pixels. It has to be considered that FTSW maps do not shows dry and wet soil regions, but they shows differences in soil water depletion. Because of the relative scale the amount of water needed to bring to 100 the FTSW of two depleted pixels having the same FTSW can be different and these maps cannot be read in this way.”

P.17 L.20 Change “longer” with “longest”.

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Interactive Discussion

Discussion Paper



P.17 L.20 Moreover, values of leaf water potential (LWP) in the period from July 9 to 16 are not showed in fig. 1, so it is not possible to verify the drop off in LWP commented by the Authors.

There was an error in the figure which has been changed.

P.16 L.22 Errors could cumulate, but even compensate. Of course only in the first case the final errors will result higher.

For sure this is true, and you highlight an interesting point which will merit further considerations. With the assumption that errors are normally distributed with mean equal to zero, the most accurate estimation is the given accuracy of the model, without reduction (as in the case of this article) or improvement. However, the behaviour of errors cannot be exactly estimated without knowing the true values of FTSW (and not the TDR ones, which are also inaccurate). These values are not available and therefore in our opinion the most realistic estimation, although pessimistic biased is to consider all errors as cumulating. Doing so the method loose in power, but remaining patterns have more chances to be significant. The loose in power is therefore just apparent because it allows to discriminate and identify the main patterns.

P.18 L.1 Authors refer to the “maps of August when water deficit is higher”. Probably they should precise to which map or maps are they referring to, because only on Aug. 21 the water deficit is relatively higher than the other periods. In any case, it should be noticed that, according to the measured predawn LWPs it seems that the plants, in the considered period, have been never under severe stress conditions.

Interactive
Comment

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Interactive Discussion

Discussion Paper



The map has been specified, it is the 21st August. The plant water stress is never severe, but here we speak in relative and compare to other measurement dates. This has also been specified but we think that the best place would be when introducing the data at P.17 L.6. We introduced it here by modifying the sentence: “The grapevine water deficit followed the same pattern” with this addition “even if it never indicated a severe plant water stress but moderate”.

P.18 L.8 Correct “les” with “less”

CORRECTED

P.18 L.15 Fig. 3 is now related to the “two years of observations” and “28 measurements”, but no details, again, were provided on the materials and methods.

Material and methods section has been inserted, we hope this should be clearer now.

P.18 L.15 In any case all the comments are qualitative and no discussion has been related to the possible effects of soil evaporation, as well as those related to vegetation that should be present between the plant rows.

All comments are qualitative because the purpose of the paper was to review the technique and describe its application, while the case study was just a way to let the uninformed reader figure out the subject of the article, and then fire up the curiosity for the technique. This was also the reason why a material and method section was not inserted, being this generally avoided in a review. The paper never had the scope to solve a specific scientific question. Furthermore, in P.17.L.23 we specify : “A low FTSW value is not necessarily the sign of greater root absorption, but is primarily the sign of the depletion of the water reservoir”, meaning that all factors such as evaporation, etc. are included without distinction.

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Interactive Discussion

Discussion Paper



P.19 L.4 I suggest, again to change “depending on” with “depend on”.

SOIL

1, C535–C541, 2015

CORRECTED

Fig. 1 – It is better if Authors provide the color palette near the figure.

INCLUDED

The x-axes of the “ombrotermic diagram” should be a temporal scale, but the numbers indicated do not allow readers an immediate comprehension of their meaning. Considering that they indicate the period of investigation (from begin of July 2013 to September 13, 2013), Authors should avoid to use 2013 as written on the top of the graph, but the exact period to which the data are referred to.

This diagram has been modified

Moreover, are the maps related to a vine row, being the distance between plants about 0.9 m? This information should be specified in the text.

It has been specified in material and method section.

Why the temporal scale in the lower left side starts from July 16 and not from July 1, as indicated in the graph on the right?

To better understand the plant water stress which is illustrated by the graphic on the right the reader will probably want to know the meteorological conditions of the previous weeks.

Please also note the supplement to this comment:

<http://www.soil-discuss.net/1/C535/2015/soild-1-C535-2015-supplement.pdf>

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Interactive Discussion

Discussion Paper

