Review of: "Meta-Omics Analyses of Organic and Conventional Fermented Vegetables Reveal Differences in Health-Boosting Potential"

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Potential competing interests: No potential competing interests to declare.

The proposed work deals with the characterization of differently grown vegetables, namely carrots, peppers, and radishes after a so-called natural fermentation.

The findings of the proposed work are surely interesting, but it has been suggested that some changes be made to better highlight the evidenced differences in the Abstract, to make the work more attractive to readers.

First of all, the Authors are requested to better clarify in the Abstract the use of the term “natural” related to the studied fermentation systems. Does it mean that the assayed vegetables have been subjected to fermentation without external inoculation of microbes, exploiting the naturally present microbiome on the vegetables? Please highlight this important point.

Moreover, a brief explanation in the Abstract should be given for the term “regenerative” regarding the assayed organic growing system used to produce the vegetables. Finally, the Abstract reports that a study on “untargeted metabolomics” has been performed. Some more information on this aspect should be reported, for example, reporting the type of metabolites (chemical classes, plant or microbe origin, and so on; I have seen from M&M section that the attention has been focused on organic acids and amino acids).

The Introduction section is generally well conducted, well documented, and referenced, and the scope of the work is clear. However, I request better clarification and literature enforcement in the paragraph regarding regenerative organic agriculture, especially where it has been stated:

a) “… crop rotation, no-till, and other practices that actively rebuild soil communities ...”;

b) “… are thought to result in more microbial soil life ...”;

c) “… more nutrient-rich food.” In what terms of nutrient presence?

As regards M&M:

- The description of the selected vegetables used for the experiment is not clear in the point “… (conventional =*Capsicum* and organic = *Capsicum annuum*) ...”: Are two different species or varieties? I see from Figure 1 that the shape of the

assayed peppers in conventional and organic cultivation is different. This is not a good point for the scientific value of the work.

Moreover, it has to be reported also for the other assayed crops (carrot and radish) that the used varieties in the experiment are the same for conventional and organic farming, to make the comparison robust. Different varieties of the same vegetable can strongly give a different behaviour in different agroecosystems. Please clarify and correct where necessary.

Moreover, the Authors are requested to avoid the measurement units not belonging to the cgs system, such as pounds, and other points of the manuscript where they are cited.

Check carefully the abbreviations, where necessary: is DC the abbreviation of dansyl chloride?

Correct to “glacial acetic acid.”

In the paragraph “Analysis of Spectral Data,” give the units of quantification for the identified metabolites by LC-MS.

As regards Results:

- The data in the paragraph regarding the evaluation of the alpha diversity between conventional and organic samples seem very interesting, and no report has been given in the Abstract. Please highlight these data.

- In Figure 3A, please correct the indication of the 14th day of fermentation in bacteriome analyses for the radishes. The number 7 has been reported.

- The findings in the paragraph on taxonomic diversity are very interesting, showing big diversities between conventional and organic systems, but they have not been highlighted enough in the Abstract. Please better clarify this point with a brief sentence.

- Also, the findings of organic acids need to be better highlighted in the Abstract, especially for the variations in lactic acid, with variable changes (I should avoid the term “inconsistent”) among selected conventional and organic vegetables.

As regards the Discussion, and especially the Conclusions, I agree with the Authors. Reporting, data are often variable within cropping systems and also within assayed crops (obviously within days of fermentation), where they affirm that more research is needed in this field and that the data given in this study have to be considered as preliminary, opening the way to further studies.