

This article presents a relevant study on the use of rice straw as an alternative bulking agent for sewage sludge composting and evaluates its agronomic effects under real field conditions in a commercial citrus orchard. A major strength of the work is its practical approach, as it combines industrial-scale compost production with field application over two growing seasons, providing valuable evidence of the potential of RS–SS compost as a sustainable strategy for organic waste valorisation and soil fertility improvement. However, the manuscript also presents some weaknesses and aspects that should be improved before it can be considered suitable for publication in a journal such as SOIL. In particular, the introduction and discussion would benefit from a clearer focus, reduced repetition, stronger synthesis of the results, and a more explicit interpretation of the differences observed between the two experimental seasons.

Response:

We sincerely thank Dr. Madejón for her positive assessment of our work and for her valuable and constructive comments. We greatly appreciate her recognition of the practical relevance of the study, particularly the industrial-scale production of rice straw–sewage sludge compost and its evaluation under commercial field conditions.

Following her suggestions, the manuscript has been extensively revised. The Introduction was shortened and refocused to better emphasise the novelty and practical relevance of using rice straw as an alternative bulking agent for sewage sludge composting. The Materials and Methods section was clarified in several aspects of the experimental design. The Discussion was substantially reorganised to improve readability, reduce repetition and excessive literature comparisons, and provide a clearer interpretation of the results. Particular attention was devoted to the interpretation of the seasonal responses observed throughout the study, taking into account that S1 evaluated the effects of an initial compost application whereas S2 assessed the response to a subsequent application on the same plots. The revised manuscript now more clearly describes the experimental context of each growing season and avoids direct comparisons between composts or between growing seasons. Overall, these revisions have improved the clarity, focus and scientific interpretation of the manuscript.

Introduction

A major strength of this work is the identification of rice straw as an alternative bulking agent for sewage sludge composting. Finding sustainable substitutes for pruning residues as bulking materials is currently an important concern within the sector, and the authors should place greater emphasis on this aspect of the study to:

Reducing the legislative background and focusing only on the most relevant policies. Shortening repetitive explanations about compost benefits that are already well established.

Improving the flow between paragraphs so the narrative moves more directly from the problem (rice straw management) to the proposed solution (RS–SS compost).

Clarifying the novelty earlier, especially the industrial-scale composting and its application in citrus orchards under flood irrigation.

Reducing citation density where possible.

Response:

We thank Dr. Madejón for these valuable suggestions. We fully agree that the identification of rice straw as a sustainable alternative bulking agent for sewage sludge composting represents one of the main strengths of this work. Following her recommendations, the Introduction has been substantially revised and streamlined. The legislative background was reduced to include only the most relevant policies, repetitive explanations regarding the benefits of compost application were shortened, and the overall structure was reorganised to improve the flow from the problem of rice straw management to the proposed solution based on rice straw–sewage sludge composting. Greater emphasis is now placed on the use of rice straw as a sustainable alternative bulking agent for sewage sludge composting and on the agronomic potential of the resulting compost. In addition, the novelty of the study is highlighted more explicitly, particularly the industrial-scale production of RS–SS compost, its agronomic characterisation, and its validation under field conditions in a commercial citrus orchard managed under flood irrigation. Citation density was also reduced where possible to improve readability.

Materials and Methods:

This experimental description is clear, detailed, and generally well structured. It provides essential information about the field conditions, treatments, experimental design, and management practices, which supports reproducibility. The use of a commercial citrus orchard and two growing seasons is also a strong point because it increases the practical relevance of the study.

However, the section could be improved by making it more concise and easier to follow. Some sentences are overly long and contain too many details at once. I would also recommend:

Explaining more explicitly why mineral fertilisation was maintained together with compost treatments, since this is important for interpreting the results.

Response:

We thank Dr. Madejón for her positive assessment of the experimental design and for this valuable suggestion. Following her recommendation, additional information has been incorporated into the Materials and Methods section to explain more explicitly why mineral fertilisation was adjusted during the experiment. As the study was conducted under commercial orchard conditions, mineral fertilisation was initially maintained to ensure adequate crop nutrition and to avoid masking the effects of compost application. In this context, based on the compost characterisation and soil analyses, mineral fertilisation rates were corrected according to the increase availability of nutrients in the soil, leading to a reduction in P fertiliser units during S2 (10%). This information is now more clearly described in the revised manuscript.

Specify the total number of experimental plots used. As I understand the design, there are two composts plus the control, two application rates, and three replicates per treatment, resulting in a total of 15 experimental plots. Is that interpretation, correct?

Response:

We thank Dr. Madejón for pointing out this lack of clarity. The experiment consisted of three treatments (control, single compost dose, and double compost dose), each replicated three times, resulting in a total of nine experimental plots. The same plots were maintained and monitored throughout the two growing seasons. COMP1 was applied in S1 and COMP2 in S2; therefore, the study did not involve 15 independent plots but rather the sequential evaluation of two composts in the same experimental plots over two consecutive growing seasons. This aspect has now been clarified in the revised manuscript.

Results

In the Results section, little emphasis is placed on the differences observed in soil determinations between the two seasons. There is a decrease in almost all parameters except for microbial biomass C. Could a statistical analysis be performed to evaluate the differences between the two seasons?

Response:

We thank Dr. Madejón for this valuable observation. We agree that the differences observed in several soil parameters between S1 and S2 are of interest and deserve consideration. However, statistical comparisons between seasons were not performed because the two seasons addressed different experimental situations. While S1 evaluated the effects of the initial compost application, S2 assessed the effects of a subsequent application on plots that had already received compost during the previous growing season, thereby incorporating cumulative effects. In addition, mineral fertilisation management differed between seasons, particularly due to the reduction in P fertiliser units implemented in S2. Consequently, the two seasons represent different experimental conditions and objectives, and cannot be considered directly comparable for statistical purposes.

To address this concern, the manuscript has been revised to clarify the experimental design and statistical approach. In addition, the Results and Discussion sections were revised to provide a more detailed qualitative interpretation of the trends observed across growing seasons. Given that S1 and S2 were analysed independently and do not represent directly comparable experimental conditions, these observations are discussed descriptively rather than statistically. Particular emphasis has been placed on potential explanations for the general decrease observed in several soil parameters and the contrasting behaviour of microbial biomass C and other biological indicators, as well as their relevance for the overall interpretation of the results.

Discussion:

The discussion is scientifically solid and very well referenced, but it is excessively long, repetitive, and sometimes reads more like an extended literature review than a focused interpretation of the results. Many ideas are repeated several times (especially regarding OM, salinity, nutrient availability, and previous studies), which weakens the overall impact of the discussion.

A major weakness is that the discussion does not sufficiently emphasize the differences between S1 and S2, despite the two-season approach being one of the strengths of the experiment. The seasonal responses are mentioned, but they are not deeply interpreted. For example:

Why were microbial effects significant in S1 but not in S2?

Why did some soil parameters respond only in S2?

Did the second compost application produce cumulative effects?

Were climatic or management differences between seasons relevant?

These aspects should become central to the discussion because they provide the most interesting biological and agronomic interpretation of the study.

Response:

We thank Dr. Madejón for this detailed and constructive assessment of the Discussion section. Following her recommendations, the Discussion has been substantially revised to improve its focus, readability, and interpretative value. Repetitive sections were shortened, several literature comparisons were reduced, and the text was reorganised around the main themes addressed in the study, including soil fertility, microbial activity, plant nutrition, and crop performance.

Particular attention was devoted to the interpretation of the seasonal trends observed throughout the study. Although direct statistical comparisons between S1 and S2 the two growing seasons represented different experimental situations and objectives, the revised Discussion now includes a more detailed qualitative interpretation of the observed responses. In particular, additional discussion has been incorporated regarding the contrasting behaviour of microbial biomass C and dehydrogenase activity, the occurrence of treatment effects only in S2 for some soil parameters, the potential contribution of successive compost applications over time, and the influence of environmental and management-related factors on observed seasonal patterns. These observations are discussed descriptively and are not intended to represent statistical comparisons between growing seasons.

In addition, the novelty of the study, namely the industrial-scale production of rice straw–sewage sludge compost and its validation under commercial citrus orchard conditions, is now highlighted more clearly throughout the Discussion. Overall, these modifications have resulted in a more concise, focused, and interpretative discussion with greater attention given to the seasonal trends observed throughout the study and the potential effects of successive compost applications on soil and crop responses.

I would improve the discussion by:

Reducing repetition and shortening literature comparisons.

Focusing more on interpretation rather than describing every result again.

Structuring the discussion around key themes (soil fertility, microbial activity, plant nutrition, yield).

Explicitly comparing S1 vs S2 responses throughout the text.

Highlighting the novelty of the RS–SS compost and the industrial-scale validation more clearly.

Shortening considerably. secondary explanations and excessive citations

Overall, the discussion contains valuable information, but it needs stronger synthesis and clearer emphasis on the temporal dynamics between the two campaigns.

Response:

We thank Dr. Madejón for these valuable recommendations. Following her suggestions, the Discussion has been thoroughly revised and condensed. Repetitive sections and secondary explanations were reduced, several literature comparisons were shortened, and excessive citations were removed where they did not contribute directly to the interpretation of the results.

The Discussion was also reorganised into thematic sections addressing soil fertility, microbial activity, plant nutrition, and crop performance, which improved the overall structure and readability of the manuscript. Greater emphasis is now placed on the interpretation of the results rather than on the description of individual findings. In addition, the revised text incorporates a more explicit discussion of the of the seasonal patterns observed across the two growing seasons highlighting the different responses observed during each season and exploring their possible causes, including the potential influence of successive compost applications as well as environmental and management-related factors. As noted above, these observations are discussed qualitatively, acknowledging the limitations associated with direct statistical comparisons between growing seasons.

Finally, the novelty of the study, including the industrial-scale production of rice straw–sewage sludge compost and its field validation under commercial citrus orchard conditions, has been highlighted more explicitly throughout the Discussion. Overall, these revisions have resulted in a more concise, focused, and synthesised discussion with a stronger emphasis on the biological and agronomic interpretation of the results.

We would like to sincerely thank Dr. Madejón once again for her careful reading of the manuscript and for her valuable comments and suggestions. Her observations have been extremely helpful in improving the clarity, structure, and interpretation of the study. We hope that the revisions made in response to her comments have substantially strengthened the manuscript and improved its overall quality.

Response to Reviewer #1

We sincerely thank the reviewer for the careful evaluation of our manuscript and for the constructive comments and suggestions. We believe that these comments have helped us to improve the clarity and scientific quality of the manuscript. All comments have been carefully considered and addressed in the revised version. Our responses are provided below.

General comment:

Reviewer comment:

The paper 'Field application of rice straw–sewage sludge compost in Mediterranean citrus orchards: effects on soil properties, nutrient status and fruit quality' by Rodríguez-Carretero et al. deals with the use of compost obtained from rice straw and sewage sludge on citrus trees. Although the Materials and Methods section states that the experiment was conducted over two growing seasons, the manuscript actually reports two independent experiments performed in two consecutive years. This distinction has important implications for the interpretation of the results. In particular, COMP1 and COMP2 were not directly compared under the same experimental conditions, as they were applied in different growing seasons. Therefore, conclusions regarding differences between the two composts are not fully supported. Furthermore, the duration of each experiment (one growing season) is insufficient to draw robust conclusions regarding changes in soil properties, especially those related to soil organic matter and soil physicochemical characteristics, which generally require long-term investigation.

Response:

We thank the reviewer for this important observation. We agree that the original version of the manuscript did not sufficiently emphasise that COMP1 and COMP2 were evaluated in two consecutive growing seasons rather than through a simultaneous comparison within a single experiment. To address this issue, the Materials and Methods section has been revised to clarify the experimental design, explicitly stating that COMP1 was applied at two rates (10 and 20 t ha⁻¹) in S1, whereas COMP2 was applied at the same rates in S2 to the plots that had previously received COMP1. Consequently, S2 does not represent an independent repetition of S1, but rather the evaluation of a successive compost application under commercial orchard conditions.

The statistical analysis section has also been revised to indicate that data from each growing season were analysed independently and that no statistical comparisons between seasons were performed. In addition, the objectives, results interpretation and discussion have been revised throughout the manuscript to avoid direct comparisons between composts and to focus on the agronomic performance of each compost under the conditions of the corresponding season. Particular attention has been given to the interpretation of seasonal trends and the potential influence of successive compost applications, while explicitly acknowledging that these observations are qualitative and do not constitute statistical comparisons between growing seasons. Regarding the duration of the study, we acknowledge that one growing season is insufficient to draw definitive conclusions regarding long-term changes in soil properties. However, the study includes two consecutive years of compost application, allowing the

evaluation of both short-term effects and the response following a subsequent compost application. Accordingly, the Discussion and Conclusions sections have been revised to better define the scope of the findings, to avoid overinterpretation of the observed soil responses, and to highlight the need for long-term studies to assess the persistence and cumulative effects of compost application on soil fertility and crop performance.

Additional comments are provided below:

Line 107, spell out ANP

Response:

ANP was already defined at its first appearance in the Introduction as Albufera Natural Park (ANP).

Line 137: actually here 2 experiments are reported, 1 year-long each

Response:

We agree with the reviewer and thank him/her for this important observation. The description of the experimental design has been revised to clarify the nature of the study. It is now clearly indicated that compost applications were carried out on the same trees across both growing seasons. Specifically, COMP1 was applied in S1, and COMP2 was subsequently applied in S2 to the same plots as part of a continued management strategy. Therefore, the study should not be interpreted as a direct comparison between two independent experiments, but rather as the evaluation of successive compost applications under commercial orchard conditions. In this context, S1 assessed the effects of the initial compost application, whereas S2 evaluated the response to a subsequent compost application on plots that had already received compost during the previous growing season. Consequently, the effects observed in S2 reflect the cumulative influence of successive compost applications rather than the isolated effect of COMP2.

These clarifications have now been incorporated into the Materials and Methods section and considered throughout the interpretation of the results and discussion.

The analysis of pruning residues, rice straw and sewage sludge would help to understand the fertilization potential of composts

Response:

We thank the reviewer for this suggestion. The physicochemical characteristics of the feedstocks used for compost production (rice straw, pruning residues and sewage sludge) were determined and reported in our previous publication describing the industrial-scale composting process. To improve clarity, we have incorporated the following sentence in Section 2.1:

“The physicochemical characteristics of the feedstocks used for compost production (rice straw, pruning residues and sewage sludge) have been previously reported by Rodríguez-Carretero et al. (2023).”

Line 96, point 1 cannot be achieved, there is no comparison between COMP1 and COMP2

Response:

We thank the reviewer for this observation. We agree that the wording of the original objective could be interpreted as implying a direct comparison between COMP1 and COMP2. Since both composts were evaluated in different growing seasons and no statistical comparison between seasons was performed, the objective has been reformulated.

The revised manuscript no longer presents the study as a direct comparison between the two composts. Instead, the first objective is now focused on analysing the agronomic quality and regulatory compliance of industrial-scale sewage sludge-based composts produced using different bulking agents.

Furthermore, the overall objectives and hypotheses have been revised to emphasise the evaluation of industrial-scale sewage sludge-based composts produced with different bulking agents and the assessment of short-term and cumulative effects of successive compost applications under citrus orchards conditions, rather than the direct comparison of COMP1 and COMP2.

The difference between the two composts clearly depends on the proportion of sewage sludge (line 107)

Response:

We agree that the proportion of sewage sludge is an important factor influencing compost composition. In the revised manuscript, we have clarified the composition of both composts and explicitly described the ratios used during composting. We also revised the discussion to avoid attributing observed differences exclusively to the bulking agent, acknowledging that both the nature of the bulking material and the relative proportion of sewage sludge may have contributed to the differences observed between composts. So, the interpretation of the field results considers both differences in compost composition and the cumulative effects associated with successive compost applications.

Line 98, point 2 is quite ambiguous since non comparison between the 2 compost were carried out

Response:

We agree that the original wording could be interpreted as implying a direct comparison between the two composts. Following this suggestion, the objective has been revised to avoid this interpretation. The revised manuscript now states that the study aimed to evaluate the short-term and cumulative effects of successive compost application on soil physicochemical properties, plant nutritional status, yield and fruit quality in a commercial citrus orchard under flood irrigation conditions. Consequently, the focus has shifted from comparing composts to assessing the agronomic responses associated with successive compost applications under field conditions.

Were COMP1 and COMP2 applied to the same soils or on different plots

Response:

Both composts were evaluated in the same commercial citrus orchard and on the same experimental plots, which were maintained and monitored throughout the study period. The same trees were followed during both growing seasons. COMP1 was applied in S1 and COMP2 in S2. Consequently, S2 evaluated the response to a subsequent compost application on plots that had already received compost during the previous growing season. To clarify this aspect, the description of the experimental design has been revised in the Materials and Methods section. The revised manuscript now explicitly states that the plots were maintained throughout both growing seasons and that the two composts were evaluated sequentially rather than simultaneously. The manuscript also clarifies that S2 reflects the cumulative effects of successive compost applications rather than the isolated effect of COMP2.

Line 200, The compost pH appears relatively low. Was the sewage sludge treated with gypsum? This hypothesis may be supported by the increase in soil Ca reported in line 269. Please clarify the source of Ca.

Response:

We thank the reviewer for this observation. To our knowledge, the sewage sludge used for compost production was not treated with gypsum prior to composting. Furthermore, no significant increase in assimilable Ca concentration was observed following compost application. As shown in Figure 1, Ca concentrations were very high in all treatments and seasons, reflecting the calcareous nature of the soil. We have clarified this point in the response to avoid possible misinterpretations.

Line 204 spell out OOC

Response:

OOC has been defined at its first appearance in the manuscript as oxidisable organic carbon.

In table, when ANOVA is not significant, no mean separation is required

Response:

We thank the reviewer for this observation. Mean separation letters were only included when treatment means were compared within each season. However, we agree that when the overall ANOVA is not significant, displaying mean separation letters may be considered unnecessary. Since this is largely a matter of presentation style and different journals adopt different conventions, we have retained the original format for consistency throughout the manuscript. Nevertheless, if the editor considers it more appropriate, we would be pleased to modify the tables accordingly.

Line 247: What is meant by “optimal” soil organic matter content? Please provide a reference range and clarify whether this statement refers to agronomic recommendations.

Response:

We thank the reviewer for pointing out this lack of precision. We agree that the term “optimal” was too general and could be open to interpretation. Therefore, the text has been revised to avoid this term. The revised manuscript now refers to the classification proposed by Legaz et al. (1995) and explicitly indicates the corresponding categories for soil organic matter content in citrus soils, providing a clearer agronomic interpretation of the results.

Line 250: OM decreased in the 2 seasons; how do you explain it?

Response

The decrease in OM observed between growing seasons may be related to the rapid mineralisation of organic matter under Mediterranean conditions, where relatively high temperatures favour microbial activity and organic matter turnover. However, additional factors may also have contributed to this trend, including differences in environmental conditions between seasons, variations in mineralisation rates, and the inherent variability associated with field soil sampling. Since statistical comparisons between seasons were not performed, these observations are interpreted qualitatively. This explanation has been incorporated into the revised Discussion section.

Table 6 different font

Response:

We thank the reviewer for noticing this formatting inconsistency. The font style in Table 6 has been corrected to ensure consistency with the rest of the manuscript.

No comparison between COMP1 and COMP2 can be made (line 326-328)

Response:

We thank the reviewer for this observation. We agree that a direct statistical comparison between COMP1 and COMP2 is not appropriate because both composts were evaluated in different growing seasons. Furthermore, COMP2 was applied in S2 to the same plots that had previously received COMP1 in S1, so S2 reflects the response to a successive compost application rather than an independent evaluation of COMP2. Accordingly, the manuscript has been revised and statements implying direct comparisons between composts have been removed. The Results and Discussion sections now focus on treatment effects within each growing season and on the interpretation of seasonal trends without performing statistical comparisons between seasons.

Comparison of chemical analysis between COMP1 and COMP2 (line 334) are adventurous since only 4 replications were used

Response:

We thank the reviewer for this comment. We acknowledge that a larger number of compost samples could have provided a more robust estimation of compost variability. However, the final characterisation was based on four representative composite samples of each compost, each obtained from several subsamples collected from different locations within the composting piles. The statistical analyses presented in Table 1 were performed to characterise and compare the physicochemical properties of the composts used in the study. Nevertheless, following the reviewer's suggestion, we have revised the discussion to avoid overinterpreting these differences and to ensure that the observed contrasts between COMP1 and COMP2 are presented with appropriate caution.

Line 347, 2 years of compost application are unlikely to be sufficient to produce soil physicochemical changes, such effects generally require long-term study

Response:

We agree that changes in several soil physicochemical properties generally require long-term applications. The Discussion has been revised to place the results within the appropriate temporal context and to indicate that the responses reported here correspond to the first two years following compost implementation. Nevertheless, the significant changes detected in several soil fertility indicators, including organic matter, organic N, available P and K, demonstrate that measurable effects of compost application can already be observed during the early stages of implementation. Therefore, the present study should be considered as an assessment of short-term and early cumulative responses, whereas longer-term studies are still required to evaluate the persistence and long-term implications of these changes.

Line 385-386: I suggest that the Authors estimate the amount of C applied through compost relative to the total soil C pool. Without such information, the reported increase appears difficult to reconcile with the amount of compost applied and may reflect analytical variability rather than a true treatment effect.

Response:

We appreciate this suggestion. However, bulk density was not measured during the experiment, which prevents an accurate estimation of the total soil C pool. Accordingly, no reliable estimation of soil C stocks could be performed. We have therefore tempered the interpretation of the observed increases in soil organic matter and acknowledge that part of the variation may reflect the inherent variability associated with field measurements.

Nevertheless, the increase in soil OM was accompanied by changes in other soil fertility indicators, including increases in organic N and plant-available nutrients, as well as enhanced biological activity during S1. These concurrent responses support the interpretation that compost application had measurable effects on soil properties, although the magnitude of changes in soil C stocks cannot be reliably quantified from the available data.

Additional long-term studies including soil C stock determinations would be valuable to further assess this aspect.

Since compost was not tilled into the soil, this reduces the effect on soil physical characteristics

Response:

We agree that incorporating compost into the soil can enhance its influence on certain soil physical properties. However, in the present study, compost was surface applied intentionally in order to reproduce the management practices commonly used in commercial citrus orchards under Mediterranean conditions. Therefore, this should not be considered a limitation of experimental design, but rather a reflection of realistic agricultural management.

Despite the absence of tillage, significant effects of compost application were observed for several soil fertility indicators, including organic matter, organic N, available P and K, soil pH, and biological activity. These results indicate that measurable soil responses can occur under the management conditions typically used by growers.

The Discussion section has been revised to clarify this aspect and to place the results within the context of commercial citrus production systems.

We sincerely thank the reviewer again for the constructive comments and suggestions. We hope that the revisions made in response to these comments have substantially improved the quality and clarity of the manuscript.

The manuscript is generally well organised and presents relevant results regarding soil fertility and nutrient dynamics after compost application. However, some aspects related to experimental design, statistical interpretation, and discussion of the results should be clarified or interpreted more cautiously before the manuscript can be considered for publication.

We would like to thank the reviewer for the careful evaluation of our manuscript and for the constructive comments provided. We appreciate the positive assessment of the overall organisation of the manuscript and the relevance of the results presented. All comments have been carefully considered and the manuscript has been revised accordingly. Our responses are provided below.

Specific comments

Lines 92–99: The hypotheses and objectives should be reformulated more carefully. Since COMP1 and COMP2 were applied in different growing seasons, direct comparisons between both composts should be interpreted cautiously.

RESPONSE:

We thank the reviewer for this observation. We agree that the original wording could be interpreted as implying a direct comparison between COMP1 and COMP2. Since both composts were evaluated in different growing seasons and no statistical comparison between seasons was performed, the hypothesis and objectives have been reformulated.

The revised manuscript now explicitly recognises that COMP1 was applied in S1 and COMP2 was subsequently applied in S2 to the same plots that had previously received COMP1. Consequently, the study does not evaluate two independent compost treatments, but rather the short-term and cumulative effects of successive compost applications under commercial orchard conditions.

Accordingly, the revised hypothesis focuses on the effects of successive applications of sewage sludge-based composts produced with different bulking agents, whereas the objectives now address (i) the agronomic quality and regulatory compliance of the composts and (ii) the evaluation of their short-term and cumulative effects on soil properties, plant nutritional status, yield, and fruit quality. The revised manuscript focuses on evaluating the agronomic performance of industrial-scale sewage sludge-based composts produced with different bulking agents and assessing their effects under field conditions, rather than on directly comparing the two composts.

Section 2.2.1 (Lines 130–143): Although the manuscript refers to “two consecutive seasons”, the experiments differed between seasons regarding compost type and fertilisation management. This limitation should be acknowledged more explicitly.

RESPONSE:

We thank the reviewer for this valuable comment. The description of the experimental design has been expanded in Section 2.2.1. The revised manuscript now explicitly states that COMP1 was applied in S1 and COMP2 in S2 to the same plots that had previously received COMP1, meaning that the second growing season evaluated the response to a successive compost application under commercial orchard conditions. that the revised text also clarifies that mineral fertilisation management differed between seasons, and that that data from S1 and S2 were analysed independently, without statistical comparisons between growing seasons. These aspects are now more clearly described in the Materials and Methods section and are considered throughout the interpretation of the results.

Lines 139–142: The reduction in P fertilisation during S2 introduces an additional management factor that may influence comparisons between seasons.

RESPONSE:

We agree that the reduction in P fertilisation during S2 represents an additional management factor that may have influenced the observed responses. The revised manuscript now explicitly describes this modification and clarifies that data from S1 and S2 were analysed independently, without statistical comparisons between growing seasons. However, it should be noted that the reduction in P fertiliser inputs was implemented deliberately as part of the agronomic management strategy and was based on soil and foliar analysis results obtained during S1. This approach reflects commercial orchard management, where mineral fertilisation programmes are progressively adjusted according to crop nutritional status and soil fertility. In this regard, the reduction of P input forms part of the practical evaluation of compost use under field conditions rather than an unintended source of variability.

The manuscript has been revised accordingly, and the interpretation of seasonal responses now considers both the successive compost applications and the changes introduced in fertilisation management.

Section 2.2.5: The statistical approach should be described in greater detail. It would be useful to clarify more explicitly whether the seasons were analysed independently.

RESPONSE:

We thank the reviewer for this suggestion. The Statistical Analysis section has been revised to clarify that data from S1 and S2 were analysed independently. The revised manuscript now explicitly states that S1 evaluated the effects of the initial compost application, whereas S2 assessed the response to a subsequent compost application on the same plots that had already received compost during the previous growing season. In addition, compost type and fertilisation management differed between growing seasons. Consequently, no statistical

comparisons between seasons were considered appropriate and treatment effects were evaluated separately within each growing season.

Lines 247–250: The decrease in soil organic matter between seasons deserves additional discussion. Climatic conditions, mineralisation rates, irrigation management, or sampling variability could have contributed to this behaviour.

RESPONSE:

We thank the reviewer for this valuable observation. Following this suggestion, the discussion has been expanded to provide a more detailed interpretation of the decrease in soil organic matter observed between seasons. The revised manuscript now indicates that, in addition to compost management, differences in environmental conditions between seasons, variations in mineralisation rates and the inherent variability associated with field soil sampling may also have contributed to the observed trend. Given that seasons were analysed independently, these factors are discussed as potential contributors to the observed seasonal pattern rather than as statistically tested explanations.

Lines 265–278 and Figure 1: Several soil parameters showed statistically significant differences; however, the agronomic relevance of some changes should be discussed more carefully.

RESPONSE:

We thank the reviewer for this observation. Following this suggestion, the discussion has been revised to better distinguish between statistical significance and agronomic relevance. Additional explanations have been incorporated for several soil parameters, including pH, electrical conductivity, organic matter and nutrient availability, emphasising whether the observed changes are likely to have practical implications for citrus cultivation under the conditions of the study. Particular attention has been given to discussing the practical significance of the observed changes in relation to soil fertility, salinity risk and nutrient management.

Lines 288–290 and Figure 2: The microbial and dehydrogenase activity results are interesting, but these parameters are naturally variable and strongly affected by environmental conditions. This should be acknowledged more explicitly.

RESPONSE:

We thank the reviewer for this valuable comment. The discussion has been expanded to more explicitly acknowledge the natural variability of microbial biomass C and dehydrogenase activity. The revised manuscript now highlights that these biochemical indicators are strongly influenced by environmental factors such as soil moisture, temperature and sampling time, which may partly explain the variability observed between seasons and among studies reported in the

literature. In addition, the Discussion now explores possible explanations for the contrasting responses observed between S1 and S2, including differences in the composition of the organic fraction supplied by the composts, particularly oxidisable organic carbon, which represents a more readily available substrate for soil microorganisms.

Lines 318–321: Since compost application did not significantly affect yield or most fruit quality parameters, the conclusions should better reflect that the main observed effects were related to soil properties.

RESPONSE:

We agree with the reviewer. The conclusions have been revised to better reflect the main findings of the study. The revised text now emphasises that the principal effects of successive compost application were related to improvements in soil fertility and soil health indicators, including soil organic matter, organic N, and nutrient availability, as well as soil biological activity. In contrast, whereas effects on plant nutritional status, yield and fruit quality were limited under the study period. The Conclusions also now highlight the agronomic potential of industrial-scale rice straw–sewage sludge compost as a sustainable strategy for residue valorisation and soil fertility enhancement under Mediterranean citrus-growing conditions.

Lines 323–341: The discussion comparing COMP1 and COMP2 should be moderated because both composts were not evaluated simultaneously under identical field conditions.

RESPONSE:

We thank the reviewer for this observation. We agree that direct comparisons between COMP1 and COMP2 should be interpreted with caution because both composts were evaluated in different growing seasons and under different management conditions. Furthermore, COMP2 was applied in S2 to the same plots that had previously received COMP1 in S1, meaning that the second growing season evaluated the response to a successive compost application rather than an independent assessment of COMP2.

Accordingly, the discussion has been revised throughout the manuscript to avoid direct comparisons and to ensure that the results are interpreted within the context of each growing season independently. Particular emphasis is now placed on the discussion of seasonal trends, the potential influence of successive compost applications, and the factors that may explain the different responses observed during S1 and S2, without performing statistical comparisons between growing seasons.

The discussion would benefit from a more explicit consideration of the limitations associated with extrapolating these results to drip-irrigated Mediterranean citrus orchards, since the study was conducted under flood irrigation conditions.

RESPONSE:

We thank the reviewer for this valuable suggestion. A statement has been incorporated into the discussion acknowledging that the experiment was conducted under flood irrigation conditions and that caution should be exercised when extrapolating the results to drip-irrigated citrus orchards, where soil water distribution and nutrient dynamics may differ. In addition, the Conclusions section now highlights the need for long-term studies under different irrigation systems to evaluate the persistence and cumulative effects of successive compost applications and to assess the applicability of the observed responses to other citrus production systems.

Technical comments

Line 53: Spell out “ANP” at first mention.

RESPONSE:

ANP was already defined at its first appearance in the Introduction as Albufera Natural Park (ANP).

Lines 116 and 165: Spell out “OOC” at first mention.

RESPONSE:

OOC was already defined at its first appearance in the manuscript as *oxidisable organic carbon*. We have nevertheless checked the text and ensured that the definition is clearly stated in the revised version.

Table 6 formatting should be revised for consistency.

RESPONSE:

We thank the reviewer for noticing this formatting inconsistency. The formatting of Table 6 has been revised to ensure consistency with the rest of the manuscript.

Some sentences in the Discussion section could be simplified to improve readability.

RESPONSE:

We thank the reviewer for this suggestion. Several sentences throughout the Discussion section have been revised and simplified to improve clarity and readability.

We sincerely thank the reviewer again for the constructive comments and suggestions. We hope that the revisions made in response to these comments have substantially improved the quality and clarity of the manuscript.

RC3: 'Comment on egusphere-2026-1497', Anonymous Referee #3

We sincerely thank the reviewer for the careful evaluation of our manuscript and for the positive and encouraging comments.

We greatly appreciate the reviewer's assessment that the manuscript addresses an important topic, that the objectives, experimental approach, and presentation of the results are scientifically sound, and that the conclusions are well supported by the evidence presented.

Following the review process, we have incorporated several minor editorial improvements and clarifications in response to the constructive suggestions provided by the other reviewers and the community reviewer. These revisions have further improved the clarity and readability of the manuscript while preserving its scientific content.

We are grateful for the reviewer's recommendation for publication and for the time and effort devoted to evaluating our work.