

Dear Editor,

here follows the complete list of additions/modifications made to the original manuscript.

For revision we closely followed the referees' and your comments/suggestions.

Modifications are listed in ascending order of page and line numbers, reporting for each of them the relative referee's comment and authors' response.

We also checked for linguistic errors and inaccuracies, and tried to improve the text according to the referee's #1 suggestion.

For each modification, the corresponding page and line numbers in the original and in the revised manuscript are indicated.

### **Revisions according to the Referees' comments:**

#### **Page 2, line 15-16 (original) / page 2, lines 26-27 (revised)**

- **The authors:** "summer" corrected as "Summer"; "autumn" corrected as "Autumn"

#### **Page 2, line 19-20 (original) / page 2, line 29 (revised)**

- **The authors:** "the same plots of the new and the old vineyards" has been replaced by "fixed locations in each vineyard"

#### **Page 2, line 20 (original) / page 2, line 29-30 (revised)**

- **The authors:** "during the springtime" has been replaced by "every Spring"

#### **Page 2, line 21 (original) / page 2, line 30-31 (revised)**

- **The authors:** "swaths" has been replaced by "inter-rows"

#### **Page 2, line 23 (original) / page 2, lines 33-34 (revised)**

- **Anonymous Referee #1:** Do not directly use abbreviations without describing them before.
- **The authors:** "TOC, N, C/N and EC" have been replaced by: "total organic carbon, nitrogen, carbon to nitrogen ratio and electrical conductivity";

#### **Page 2, lines 27 (original) / page 2-3, lines 37-39 (revised)**

- **Anonymous Referee #1:** "it seems here that precipitation is different in the old and new vineyards"
- **The authors:** The sentence has been re-written as follows: "Rainfall appeared to have enhancing effect on microarthropod abundance, but only in the old vineyard, where the biota was more structured than in new one."

#### **Page 3, line 1 (original) / Page 3, line 40 (revised)**

- **The authors:** "old and new" has been replaced by "the old and the new"

#### **Page 3, line 2 (original) / page 3, line 41-42 (revised)**

- **The authors:** "such" has been replaced by "these"; "of about" has been replaced by "by about"

#### **Page 3, line 12 (original) / page 4, line 54 (revised)**

- **Anonymous Referee #1:** "ensures"
- **The authors:** "ensure" has been replaced by "ensures"

#### **Page 4, lines 20-22 (original) / page 5, lines 82-86 (revised)**

- **The authors:** the second of the two sentences has been clarified and better linked to the first.

Original version:

“However, the recovery of soil functions assumes a specific meaning when applied to vineyard plantation on lands of ancient agricultural use, like most of those interested by viticulture in Europe. Since only a marginal proportion of the new vineyards is planted on non-agricultural lands, the time needed to reach a new equilibrium should be assessed with reference to the same land use”

Revised version:

“However, the recovery of soil functions assumes a specific meaning when applied to vineyard plantation on lands of ancient agricultural use, like most of those interested by viticulture in Europe, where only a marginal proportion of the new vineyards is planted on non-agricultural lands. In this context, whenever a new vineyard is established on the same place of the old one, the time needed to reach a new equilibrium should be assessed with reference to the previous conditions”

**Page 5, lines 4-8 (original) / page 5-6, lines 95-98 (revised)**

- **The authors:** The sentence has been shortened.

Original version:

“These are traditionally based on a variety of soil chemical, physical and biological properties; soil organic matter, aggregate stability, microbial respiration, biological activity and diversity are some of the most frequently considered, for their multifunctional importance in soil ecosystem services and their highly sensitive response to soil perturbation.”

Revised version:

“These are commonly based on a variety of soil chemical, physical and biological properties that have a direct link to soil ecosystem functions and are highly responsive to soil perturbation, such as soil organic matter content, aggregate stability, biological activity and diversity.”

**Page 5, lines 13-19 (original) / page 5-6, lines 102-114 (revised)**

- **P. Brandmayr:** “the role of arthropods in the soil is less supported by literature survey, I suggest to enclose at least the very comprehensive paper of Culliney, 2013 –Role of Arthropods in maintain soil fertility – Agriculture, 3:629-659”
- **The authors:** additional literature supporting the role of microarthropods in the soil has been provided

Original version:

“Although microbiological indicators have been applied since many years, recently, some new methods have been proposed in the field of soil mesobiological indicators, involving the characterization of soil microarthropod communities. In fact, these organisms are recognized to play an important role in soil formation as well as in soil organic matter transformation, nutrient cycling, C accumulation and plant and microbial diversity conservation, representing a useful and effective indicator for soil quality (Parisi, 2001, Parisi et al., 2005).”

Revised version:

“More recently, new bio-indicators involving the characterization of soil arthropod communities have been proposed for soil quality assessment. Microarthropods, in particular, are a major component of soil biota and are known to be important contributors to soil formation, organic matter transformation, nutrient cycling, C accumulation and plant and microbial diversity. Furthermore, they respond significantly to changes in land management, thus gaining increasing interest as effective indicators of soil quality (Brussaard et al., 1997; Culliney, 2013; Parisi, 2001; Parisi et al., 2005).

The abundance and diversity of soil fauna integrate soil physical, chemical and microbiological properties and reflect general ecological changes, becoming an important asset in the landscape ecology and conservation tool box (Menta et al., 2008; Yan et al., 2012; Wardle, 2002). The spatial distribution of soil microarthropods and their functional groups’ abundance are influenced by human induced disturbance related to farming activities, such as soil cultivation (Paoletti and Bressan, 1995).”

**Added references**

Brussaard, L., Behan-Pelletier, V.M., Bignell, D., Brown, V.K., Didden, W., Folgarait, P., Fragoso, C., Wall Freckman, D., Gupta, V.V.S.R., Hattori, T., Hawksworth, D.L., Klopatek, C., Lavelle P., Malloch, D.W., Rusek, J., Söderström, B., Tiedje, J.M., Ross, A.V. Biodiversity and ecosystem functioning in soil. *Ambio*, 26 , 563–570, 1997.

Culliney, T.W.: Role of Arthropods in Maintaining Soil Fertility, *Agriculture*, 3, 629–659, DOI 10.3390/agriculture3040629, 2013.

Decaëns, T., Jiménez, J. J., Gioia, C., Measey, G. J., and Lavelle, P.: The values of soil animals for conservation biology, *Eur. J. Soil Biol.*, 42, 23–38, 2006.

Menta, C., Leoni, A., Bardini, M., Gardi, C., and Gatti, F.: Nematode and microarthropod communities: comparative use of soil quality bioindicators in covered dump and natural soils, *Environ. Bioind.*, 3, 35–46, 2008.

Paoletti, M.G. and Bressan, M.: Soil invertebrates as bioindicators of human disturbance. *Crit. Rev. Plant Sci.*, 15 (1), 21-26, 1995.

**Page 5, line 20 (original) / page 6, line 115 (revised)**

- **The authors:** “functions” has been replaced by “quality”

**Page 5, lines 22-23 (original) / page 6, lines 117-118 (revised)**

- **Authors:** “after pre-planting” has been changed as “after disturbance by pre-planting”; The sentence “In this paper, the results from the first five years of study are presented” has been moved from page 7 (lines 12-13) and placed here as conclusive phrase of the introduction.

**Page 6, lines 5-6 (original) / page 6, lines 124-125 (revised)**

- **P. Brandmayr:** “I found no indication of the altitude, the exposition and inclination of the hill slopes”
- **The authors:** Information on soil slope and altitude has been added as follows:

The vines (*Vitis vinifera* L. cv. Sangiovese) are grown on the top of a small hill, with gentle slope (near 5%) at about 400 m a.s.l. altitude. The area is dominated by clayey-calcareous flysch lithotype, with stony and calcareous soils classified as Cambic Skeletic Calcisol (Loamic, Aric) (IUSS Working Group WRB, 2014).

Soil exposition has been reported further on, at lines 136-140.

**Page 6, lines 13-16 (original) / page 7, lines 131-134 (revised)**

- **Anonymous referee #1:** “Give the mean annual temperature and the exact number of years of “the long-term average data” for climatic conditions (indicate the range of years better)”
- **The authors:** the required information has been added to the original text. Moreover, the sentence has been splitted into two smaller sentences:

“Based on the long-term average data (1990–2010 period), mean annual temperature is 12.3 °C and precipitation 800 mm, mostly concentrated in Autumn and Spring. The potential evapotranspiration (ET<sub>0</sub>) from April to September is 850 mm (Hargreaves and Samani, 1982), and the Winkler index is 1.856 degree days.”

**Page 6, lines 18-22 (original) / pages 7, lines 136-140 (revised)**

- **The authors:** according to P. Brandmayr’s comment previously mentioned, the text has been revised in order to add information on the vineyard exposition:

“The experimental area (figures 1.A, B, C) extends to about 40 hectares and consists of two zones: one with South-West facing aspect, covered by a 14 year old vineyard, planted in 2000 after slope

reshaping by bulldozing and back hoe ploughing down to about 0.8-1.0 m; the other one, with South-West aspect, covered by a new vineyard established in 2011 after equivalent earthworks, carried out in the Summer of 2009”

**Page 6, lines 22-23 (original) / pages 7, lines 141-145 (revised)**

- **P. Brandmayr:** “The new vineyard has been reshaped on the site of an old field, but from 1990 to 2009 this parcel was set aside, thus a sort of organic soil layer and at least a shrub vegetation was present before slope reshaping (or not?)”
- **The authors:** further information on the soil set-aside period has been provided:

“According to the ordinary management, the vineyards are periodically uprooted and re-planted, with a rest period between one vineyard and the following one. In the present case, before the new vineyard establishment, the soil had been covered by an older vineyard until 1990, followed by a set aside period up to 2009. During this period, the soil was kept abandoned, allowing the development of shrubs, weeds and wild vine plant vegetation.”

**Page 6, lines 24-27 (original) / pages 7, lines 146-153 (revised)**

- **P. Brandmayr:** “no data are given on the herbaceous vegetation that dominates the interrows (weeds or managed herb cover?)”
- **Anonymous Referee #1:** “Include the main species used for grass-cover”
- **The authors:** the text has been revised in order to provide more details on the grass-cover management in the two vineyards:

Over the whole duration of the experiment, the new vineyard was entirely cultivated by periodic tillage, according to the farm strategy to maintain the soil surface free from weeds until the start of commercial level of grape production.

The old vineyard was managed with alternating tilled (T) and grass-covered (G) inter-rows; the latter were kept under natural weed development, which was periodically mowed (two or three times per year), shredded together with plant residues and spread on the soil surface. Once a year, the grass-covered soil was scarified to 40-50 cm depth, without soil inversion, to allow soil aeration and avoid soil compaction.

**Page 7, line 1 (original) / pages 8, lines 154-160 (revised)**

- **Referee #2:** “Authors claimed that organic practices have been used; by only compost application is succinctly described. I would expect copper application rates and a better description of practices to evaluate the traffic in the vineyards”
- **The authors:** more information has been added in regards to plant disease control and machine traffic in the vineyards

“The vine disease control was based on copper treatments, but this aspect was not studied. Anyway, no particular fungal or pest disease was recorded during the study period.

Overall, in the new vineyard there has been comparatively less machine traffic, because of a lower need for plant management and protection treatments, due to the lower plant development and poor grape yields. Despite that, possible traffic-related differences between the two vineyards are supposed to be negligible, since soil mechanical stress in the old vineyard is reduced by the grass cover (this is one of the main benefits at which the grass covering is aimed)”

**Page 7, line 8-11 (original) / page 8, lines 161-164 (revised)**

- **The authors:** more details on the compost used have been added

“Both vineyards were managed organically, applying with 1.0 Mg ha<sup>-1</sup> compost per year in Autumn. The compost was a commercial pelletized product, obtained by dry-composting of livestock manure,

with the following composition: total N = 3.6%, organic N = 2,8%, total OC = 33.4%, C/N = 9.3, humic + fulvic acids = 15.2%, total P (P<sub>2</sub>O<sub>5</sub>) = 3.3%, total K = 0.28% (s.s).”

**Page 7, lines 12-25 (original) / pages 8-9, lines 173-184 (revised)**

- **Referee #2:** “The experimental design is difficult to understand. I don’t understand why authors compared “old” and “new” vineyards because the two vineyards does not have same land use before plantation. More, the “new” and “old” vineyards have different soil and weed management which can drastically influenced the responses of indicators independently of compost application. I don’t agree the pooling of grass covered and tilled inter row data because authors did not present their values nor the indicators. It is quite surprising that the grass cover has not influenced biological activities of soils”
- **The authors:** We improved the description of the sampling design and clarified the choice to pool the grass-cover and the tillage data together (old vineyard).

“The monitoring of soil chemical, physical, and biological properties over time was carried out by means of representative samples, collected annually from each vineyard in four selected 10 m<sup>2</sup> georeferenced plots, referred to as P1-P4 in the new vineyard and P5-P8 in the old vineyard (figure 1.A). Each plot was sampled during Spring in four separate points, using different sampling procedures depending on the specific analyses to be performed (details are provided in the following paragraphs). The sampling locations were the same for the whole duration of the experiment. The old vineyard was sampled in both grass-covered (P5 and P7 plots) and tilled inter-rows (P6 and P8 plots). In this regards it must be pointed out that, over the study period, no significant differences for selected soil properties were observed between the two inter-row managements. This was determined by the fact that extensive weed development promoted by the Autumn–Spring rainfall often occurred also in cultivated spaces, and that soil sampling was always performed before the first grass mowing. For this reason, the data from the grass-cover and tillage managements were pooled together for statistical evaluations”

**Page 7, lines 26-29 (original) / page 9, lines 185-187 (revised)**

- **Anonimous Referee #1:** “Explain better this lack of samples. I is not corrected addressed here”
- **The authors:** The sentence has been rewritten:  
“Experimental data were not available for soil microarthropods in 2010 (both vineyards) and for soil properties in 2011 (old vineyard); therefore, for the mentioned years, not all selected variables could be considered”

**Page 8, lines 1-4 (original) / Page 9, lines 188-192 (revised)**

- **Anonimous Referee #1:** “Why did you not record phenology nor production, because of the youth of the plants? Explain it better”
- **The authors:** This aspect has been better described:

“Neither vine phenology nor production were recorded over the five years, since in the old vineyard, owing to the youth of the plants and their delayed growth induced by poor soil conditions, no significant grape production was obtained until the end of the experimental period, except for a few small clusters in 2013 and 2014, which however were not suitable for harvest or grape yield monitoring.”

**Page 8, lines 12-13 (original) / page 9, lines 199 (revised)**

- **Anonimous Referee #1:** “Delete the sentence “Soil physical ... nitrogen.”, since you are explaining below all properties with the analytical methods”
- **The authors:** the sentence has been deleted

**Page 9, lines 4-6 (original) / page 10, lines 216-222 (revised)**

- **Anonymous Referee #1:** “Explain how you measured CO<sub>2</sub>”
- **The authors:** More information on soil sampling for microbiological analyses and microbial CO<sub>2</sub> measurement has been provided:

“Soil microbiological communities were characterized using subsamples of the same soil samples collected for soil physical and chemical analyses.

Estimation of soil organic OC mineralisation was performed by measuring the C-CO<sub>2</sub> developed [mg (C-CO<sub>2</sub>) kg soil<sup>-1</sup> day<sup>-1</sup>] from soil in closed jars (Isermeyer, 1952). A 25 g amount of oven-dried soil was rewetted to a -33 kPa water tension and incubated at 30°C. The CO<sub>2</sub> evolution after one day (representing the soil easily mineralisable C) was determined by back titration of the NaOH-absorbed CO<sub>2</sub>.”

**Page 10, lines 3-4 (original) / page 11, lines 244-253 (revised)**

- **Anonymous Referee #1:** “Include the algorithms used for the indices used”
- **The authors:** the algorithms used for diversity indices have been described:

“The DGGE patterns and band intensity were used to calculate the Shannon-Wiener index (*H*) and the Simpson index (*D*), which, along with the number of DGGE bands, were used to characterize soil microbial diversity:

$$H = - \sum_{i=1}^S p_i \ln p_i$$

$$D = - \sum_{i=1}^S p_i^2$$

where *S* is the total number of bands and *p<sub>i</sub>* is the relative abundance of the *i* band calculated as the ratio between *i* band intensity and the sum of the intensities of all the bands;

All calculations were performed using the Gel Compare II software v 4.6 (AppliedMaths) (Fabiani et al., 2009).”

**Page 11, lines 4-7 (original) / page 12, lines 278-283 (revised)**

- **P. Brandmayr:** “Arthropod sampling: soil cores of 1/3 dm<sup>3</sup> can be collected at different depths: the presence of mesofauna is strongly dependent from this factor, the exact depth in cm should be given, in most cases 1 entire dm<sup>3</sup> is collected and treated in the Berlese-Tullgren selector”
- **Anonymous Referee #1:** “Indicate the length of the soil cores to know the depth of sampling”
- **The authors:** Additional details on microarthropod sampling and laboratory extraction procedure have been provided:

“All biological determinations were performed once a year from 2011 to 2014, collecting 1/3 dm<sup>3</sup> soil cores at 0-10 cm depth from 4 replicated zones within each vineyard. For the extraction of microarthropods, the soil samples were placed in Berlese-Tullgren funnels for 5 days. The soil was allowed to dry from the top down, by means of a heating light; the microarthropods moving through the soil were collected into a preservative solution (80 % ethanol) and afterwards identified to the order level using a stereo microscope.”

**Page 11, lines 14-19 (original) / page 13, lines 290-294 (revised)**

- **The authors:** the use of principal component analysis has been better described:

Original version:

“In order to evaluate the resilience of the new vineyard, a Principal Component Analysis (PCA) was performed. For each experimental year, the analysis was run on the matrix correlation, therefore, without variable standardisation. The results are reported graphically as variance of cases and variable biplots. Furthermore, a separate PCA was done on the whole 2010–2014 dataset, with and without the inclusion of climate variables.”

Revised version:

"A principal component analysis (PCA) was performed for each experimental year, in order to explore similarities and differences between the two vineyards and to understand the pattern of interrelationships among selected soil parameters over time. A separate PCA was done for the whole 2010-2014 dataset, with and without the inclusion of climate variables. The results are displayed graphically as score and loading plots."

**Page 13, lines 19-22 (original) / page 15, lines 346-349 (revised)**

- **Anonymous Referee #1:** "You say that the Simpson index showed not significant differences except for 2013. However, there are also differences in 2012 according to Fig 5. Correct"

- **The authors:** The sentence has been corrected:

"The Simpson index showed no significant differences at the beginning and at the end of the experimental period, while during 2012 and 2013 it averaged higher values in the new vineyard (statistical significance levels  $P = 0.1$  and  $P = 0.05$ , respectively). Furthermore, it decreased with time in both vineyards."

**Page 13, lines 25-27 (original) / page 15, lines 353-356 (revised)**

- **Anonymous Referee #1:** "In Fig 6, for 2012 data, there is a "ns" written, indicating not significant. Is it correct? It is strange that this high difference (around 50%) is not significant"

- **The authors:** this aspect has been clarified

"Microbial respiration (Figure 6) was significantly higher in the old vineyard in 2010 and 2014 (by 61 % and 66 %, respectively). A large difference also occurred in 2012 (51 %), which was, however, not statistically significant due to a high within-vineyard variability. In 2013, the two vineyards had comparable respiration values."

**Page 14, line 5 (original) / page 16, lines 362 (revised)**

- **Anonymous Referee #1:** "According to Fig 7a, differences are not significant in 2012 and 2014, although visual differences are huge. I guess this is due to the high variability of data. Include the standard deviation in the graphs to show this variability"

- **The authors:** we ascertained an error in our dataset. The correct data allowed an improvement in the statistical significance of the difference between the two vineyards in 2014 for microarthropod abundance ( $P = 0.05$ ). Accordingly, we revised the text and Figure 7.A.

"the difference was not statistically significant only in 2012"

**Page 14, lines 20 (original) / page 16, line 376 (revised)**

- **P. Brandmayr:** "concerning the arthropods findings and counts, it would be highly recommendable to present a well structured table in the supplementary materials, containing individual numbers (abundance) and the taxa actually found"

- **The authors:** a supplementary table (Table 3), containing individual numbers (abundance), the taxa and the QBS-ar index values has been provided. Moreover, the following sentence has been added to the text to give further information about Collembola:

"In all samplings, collembolans always included eudaphic forms (e.g., Onychiuridae; EMI=20)."

**Page 15, lines 11-17 (original) / pages 16-17, lines 390-395 (revised)**

- **The authors:** The original sentence (appearing too long) has been splitted into two smaller sentences:

"It is difficult to foresee the time required to have similar soil CaCO<sub>3</sub> values in the two vineyards, and even whether it will be ever possible. The lime dynamics, in fact, may vary greatly, depending on a

number of factors controlling the dissolution/precipitation reactions and physical redistribution within the soil profile, such as climate (temperature, precipitations), water and dissolved CO<sub>2</sub> availability, soil surface and subsurface hydrology, organic matter content, biological activity and soil management (Lamb, 1990; Egli and Fitze, 2001).”

**Page 16, lines 22-23 (original) / page 18, lines 427 (revised)**

- **Anonimous Referee #1:** “Replace “poor statistical significance” by the actual P value”
- **The authors:** “The sentence “though with poor statistical significance“ was deleted to provide the actual *P* value”. The text was revised as follows:

“though with not statistically significant differences in 2012 and 2013 ( $P > 0.1$ ).”

**- Page 17, lines 11-12 (original) / page 19, line 441 (revised)**

- **The authors:** The sentence “both H’ and Band Number values appeared to be poorly correlated” has been re-written as:

“both H’ and DGGE band number were poorly correlated”

**Page 17, lines 13-14 (original) / page 19, line 443 (revised)**

- **The authors:** For precision, “After 2010” has been replaced by “from 2010 to 2013”

**Page 17, lines 15-19 (original) / page 19, lines 445-447 (revised)**

- **The authors:** The sentence has been improved:

Original version:

“The diversity indices appeared to be related to climate factors, in particular to the seasonal temperature (Fig. 10), soil CaCO<sub>3</sub> content was strictly related to low levels of microbial diversity and activity, inducing the selection of few dominant species (higher Simpson values).”

Revised version:

“The diversity indices H’ and n. bands appeared, moreover, related to the seasonal temperature (Figure 10), while the close relation between soil CaCO<sub>3</sub> and the Simpson index indicates a lower microbial diversity in the presence of higher CaCO<sub>3</sub> amounts.”

**Page 17, line 25 (original) / page 19, line 452 (revised)**

- **The authors:** “for soil” has been corrected as “of soil”

**Page 18, line 15 (original) / page 20, lines 470-471 (revised)**

- **The authors:** “immediately” has been deleted; the sentence “leading to an abundance relatively stable” has been corrected as “with a relatively stable abundance”

**Page 18, line 24 (original) / page 20, line 478 (revised)**

- **Anonimous Referee #1:** “Since you indicated that you data did not follow a normal distribution, it is not suitable to use Pearson correlations. Use Spearman instead.”
- **The authors:** the Pearson R was replaced by the Spearman  $\rho$ :

“Spearman  $\rho = 1.000$ ,  $P = 0.01$ ”

**Page 18, line 25 (original) / page 20, line 478 (revised)**

- **Anonimous Referee #1:** “Replace “Authors” by “authors”



- **The authors:** accepted

**Page 19, line 7 (original) / page 20, line 486 (revised)**

- **Anonymous Referee #1:** "Provide quotations supporting this"
- **The authors:** Quotations supporting the hypothesis stated at lines 482-486 have been added:  
(Kautz et al., 2006; Parisi et al., 2005)

added reference:

Kautz, T., López-Fando, C. and Ellmer, F.: Abundance and biodiversity of soil microarthropods as influenced by different types of organic manure in a long-term field experiment in Central Spain, *Appl. Soil Ecol.*, 33, 278-285, 2006.

**Page 19, lines 8-20 (original) / pages 20-21, lines 487-498 (revised)**

- **Anonymous Referee #1:** "Could you hypothesize why? Could you see any change in some property, environmental variable, phenotypic or productive variables, etc which could explain this drastic change?"
- **The authors:** In order to make the discussion clearer on this topic and answer to the question, we revised the original lines 8-20 as follows:

"Mites and springtails vary their abundance in a similar way (Narula et al., 1996). For both arthropods, vertical migrations have been observed in response to changes in soil moisture in grassland soils (Hassal et al., 1986). However, their abundance may follow different patterns over time, depending on the lifecycle length and reproductive strategy, as well as on their individual tolerance to temperature and moisture in the soil.

It is known that the rate of increase of springtail population is highly dependent on optimal habitat with adequate N and C supply (Johnston, 2000) and is enhanced by rainfall (Schaefer, 1995; Badejo et al., 1998). In the present study, there was no significant evidence of a relationship between the total microarthropod dynamics and soil OC and N changes over time. In the last year, the rise in the springtail population was presumably due to the high rainfall and was particularly emphasized in the old vineyard, as a result of a larger availability at the soil surface of microenvironments colonized by emi- and epiedaphic forms."

**Page 19, lines 22-25 (original) / page 21, lines 501-505 (revised)**

- **Anonymous Referee #1:** "This is not exactly correct. PC1 actually separates the new and the old vineyards not because of the explained variance is higher. PC1 separates old vineyards with negative scores from new vineyards with positive scores (of viceversa), indicating different relationships among the properties related to that PC1 within both systems. Rewrite."
- **The authors:** The sentence describing the results of the PCA has been corrected:

"The outcomes of the PCA showed a clear separation between the old and the new vineyard along the PC1 (Fig. 8), which explained 53% to 69% of variance over the years (43.6% for the overall 2010–2014 period). The results, moreover, indicated a contrasting contribution of soil biological properties (negative loadings) and most of soil physical-chemical properties (positive loadings) (Fig. 9)"

The numbers of the Figures 8 and 9 needed to be inverted.

**Page 19, line 27 (original) / page 21, line 507 (revised)**

- **The authors:** "vary between" was corrected as "varied among"

**Page 20, lines 1-2 (original) / page 21, lines 508-510 (revised)**

- **The authors:** for higher accuracy, the following corrections have been made:

“Taxa” has been replaced by “*n.* microarthropod taxa”;  
“QBS” has been replaced by “QBS-ar”;  
“Class” has been replaced by “QBS-ar class”;  
“apart from” has been replaced by “except for”;  
“show” has been replaced by “showed”  
“are” replaced by “were”

**Page 20, line (original) / page 21, line 511 (revised)**

- **The authors:** “are associate” has been corrected as “were associated”

**Page 20, line 4 (original) / page 21, line 512 (revised)**

- **The authors:** “In the case of clay” has been deleted

**Page 20, line 15 (original) / page 22, lines 520-521 (revised)**

- **The authors:** “QBS” has been replaced by “QBS-ar”; “Band Number” has been replaced by “band number”

**Page 20, lines 17-21 (original) / page 22, lines 522-525 (revised)**

- **The authors:** the text has been improved:

Original version:

“biological diversity appeared to be poorly affected by climatic parameters, such as rainfall (which was then excluded from the PC, Fig. 10). In contrast, both microbial and arthropod diversity were positively related to temperature, but microbial respiration did not. This could be due to the fact that microbial mineralization is more stably related to C and N availability, rather than to climatic factors.”

Revised version:

“In regards to climate effect, biological diversity was positively related to the temperature, but was not related to the rainfall (which was then excluded from the PCA; Fig.10). Differently, microbial respiration appeared to be more affected by TOC and TN contents rather than by climatic factors.”

**Page 20, line 22 (original) / page 22, line 526 (revised)**

- **The authors:** “plays” has been replaced by “played”; “tends” has been replaced by “tended”

**Page 20, line 23 (original) / page 22, line 527 (revised)**

- **Anonymous Referee #1:** “Clay and EC cannot be considered biochemical variables. Replace by physicochemical and biochemical variables”
- **The authors:** “biochemical variables” has been replaced by “physicochemical and biochemical variables”

**Page 20, lines 24-25 (original) / page 22, lines 528-529 (revised)**

- **The authors:** the following corrections have been made:

“QBS” has been replaced by “QBS-ar”;  
“Class” has been replaced by “QBS-ar class”;  
“Taxa” has been replaced by “*n.* microarthropod taxa”;  
“Bands” has been replaced by “*n.* DGGE bands”

**Page 20, line 27 (original) / page 22, lines 531-532 (revised)**

- **The authors:** “consequence” has been replaced by “as a consequence”

**Page 21, line 3 (original) / page 22, line 533-534 (revised)**

- **Authors:** the sentence has been improved:

Original version:

“In 2010, the initial internal heterogeneity of the new vineyard was quite higher compared to the old one, but since 2011 an increase of internal variability within the old vineyard samples occurred over time.”

Revised version:

“In 2010, the new vineyard had a higher spatial heterogeneity compared to the old vineyard; however, since 2011, the latter showed an increasing variability over time.”

**Page 21, line 4 (original) / page 22, line 536 (revised) ()**

- **Anonymous Referee #1:** “Correct “five years””
- **The authors:** “year” has been corrected as “years”

**Page 21, line 5 (original) / page 22, line 536 (revised)**

- **The authors:** “are” has been replaced by “were”

**Page 21, lines 8-11 (original) / page 23, lines 540-545 (revised)**

- **The authors:** The content of the original sentence has been articulated in two sentences, in order to resume the main results more accurately:

Original version:

“At the best of our knowledge, this work is the first attempt to set up an integrated monitoring activity of the development of soil physical, chemical, micro and meso-biological soil functions in a new vineyard, planted after earthworks which deeply influenced soil features and, in particular, biological fertility.”

“To the best of our knowledge, this work is the first attempt to set up an integrated monitoring activity of soil physical, chemical, micro- and mesobiological functions over time in a new vineyard, with the aim to understand their changes in response to pre-planting earthworks and a possible recovery to their original or a new equilibrium status. The results demonstrate that earthworks caused strong modifications in the topsoil physical and chemical properties and negatively impacted soil biological communities, at both the microbial and the mesofauna level.”

**Page 21, line 14 (original) / page 23, line 548 (revised)**

- **Anonymous Referee #1:** “Correct “two soils””
- **The authors:** “soil” was corrected as “soils”

**Page 21, line 18 (original) / page 23, line 552 (revised)**

- **The authors:** “many” has been replaced by “several”

**Page 21, lines 20-22 (original) / page 23, lines 554-555 (revised)**

- **The authors:** the sentence “also the organic farming cultivation system did not speed up markedly the recovery process” has been corrected as: “the organic farming itself appeared to be scarcely effective in enhancing the recovery process”; “limited” has been replaced by “small”; “distributed” has been replaced by “supplied”

**Page 21, lines 23-24 (original) / page 23, lines 557 (revised)**

- **The authors:** The sentence "are mainly related to vine development and slow accumulation of plant residues" has been corrected as "were mainly related to different vine development and plant residue availability"

**Page 21, line 25 to page 22, line 2 (original) / page 23, lines 558-562 (revised)**

- **The authors:** some text improvements have been made:

the sentence "the whole results of this work showed that" has been changed as: "from the overall results of this work it can be stated that"

"specific conditions" has been replaced by: "specific soil and environmental conditions"

the sentence "like the one which result from the earthworks made before vine plantation" has been changed as "like those upset by pre-planting earthworks"

"economic" has been replaced by "commercially acceptable"

**Figure 1**

- **Anonymous Referee #1:** "Explicitly indicate what P1-P8 means in the figure caption"
- **The authors:** the figure 1 caption has been revised as follows:

"The new and the old vineyards with their respective monitoring plots (P1–P5 in the new vineyard, P6–P8 in the old vineyard)."

**Figures 3, 5, 6 and 7**

- **Anonymous Referee #1:** "Include the standard deviation as error bars in all graphs to visualize the variability of data. Use in the graphs "." (dot) for decimals instead of "," (comma). Use the same number of decimals in all the numbers of the axes."
- **The authors:** all mentioned figures have been revised according to this comment

**Figures 4 and 5**

- **The authors:** in the title of both figures, "generated by Gel Compare II software" has been deleted.

**Figure 7**

- **The authors:** the title of Figure 7 has been more accurately rewritten as follows:

"Abundance and community structure of soil microarthropods and soil biological quality index (QBS-ar) in the new and old vineyard over the experimental period. The annual abundance is shown together with the cumulative rainfall from January to April (before sampling)"

**Figure 8 and 9**

- **The authors:**
  1. the order of the figures 8 and 9 has been reversed, to match the order in which they are cited in the text.
  2. In the title of the figure 8 (old figure 9), "plot of cases" has been corrected as "score plots", "experimental" has been replaced by "study" and "parameters" has been deleted.
  3. In the title of the figure 9 (old figure 8), "biplots" has been corrected as "loading plots", "experimental" has been replaced by "study" and "parameters" has been deleted.

**Figure 10**

- **The authors:** in the title, "plots" has been changed as "score and loading plots"

**Revisions according to the topical editor's comments:**

**1) The editor:** Fig. 1-A should indicate the map scale and orientation or could be completed by a map showing topographic details (slope and altitude), soil map units if available.

– **The authors:** Accepted

The map scale and orientation have been added to figure 1.A

**2) The editor:** The lack of description of grass species is also shared by reviewers, and in general the authors are invited to give more details, for instance on management practices (copper treatments, machine traffic), as they did in their responses to referee's comments.

– **The authors:** accepted.

required details have been provided:

grass management: pages 7, lines 146-153;

plant disease control and machine traffic in the vineyards: pages 8, lines 154-160

**3) The editor:** What type of compost was used? Where did it come from? What was its dry weight?

– **The authors:** accepted.

The required information has been provided at page 8, lines 161–164 of the revised manuscript

**4) The editor:** Please add some more information about the initial soil characteristics of both plots (such as depth, initial CaCO<sub>3</sub> content...) before preplanting earthworks if available.

– **The authors:**

more information about soil survey and soil properties has been provided at page 8 (lines 165-171) and by adding a supplementary table (Table 1)

“Four profiles per vineyard were dug close to the experimental plots, to describe, analyse, and classify soil types. In the old vineyard, two of them were located in the grass-covered inter-rows and the other two in the tilled inter-rows. Not any soil profile study was performed at a detailed scale prior to 2009 earthworks; however, an antecedent soil survey of the entire farm indicated that the soil type across the selected vineyards was uniform. Table 1 shows the main features of the representative soil type of the experimental area, under ordinary viticultural management and grape production.”

**5) The editor:** Table 1: please specify in title on which depth and which horizons are these properties described? 15 cm?

– **The authors:** accepted

“Table 2. Soil properties of the selected monitoring plots within each vineyard in the first year of study (soil depth = 0-15 cm).

Thank you very much

Kind regards

The authors