



Conference Abstract

# Investigating the temporal Alpha, Beta and Gamma plant diversity on 22 years monitoring approach at the LTER site “Montagna di Torricchio” (Central Apennines, Italy)

Leonardo Salvatori<sup>‡</sup>, Marco Cervellini<sup>‡</sup>, Stefano Chelli<sup>‡</sup>, Federico Maria Tardella<sup>‡</sup>, Alessandro Chiarucci<sup>§</sup>, James L. Tsakalos<sup>|</sup>, Giandiego Competella<sup>‡</sup>, Maura Francioni<sup>‡</sup>, Luciano Ludovico Maria De Benedictis<sup>‡</sup>, Roberto Canullo<sup>‡</sup>

<sup>‡</sup> University of Camerino, Camerino, Italy

<sup>§</sup> University of Bologna, Bologna, Italy

<sup>|</sup> Harry Butler Institute, Murdoch University, Murdoch, Perth, Australia

Corresponding author: Leonardo Salvatori ([leonardo.salvatori@unicam.it](mailto:leonardo.salvatori@unicam.it))

Received: 11 Apr 2025 | Published: 28 May 2025

Citation: Salvatori L, Cervellini M, Chelli S, Tardella F, Chiarucci A, Tsakalos JL, Competella G, Francioni M, De Benedictis LM, Canullo R (2025) Investigating the temporal Alpha, Beta and Gamma plant diversity on 22 years monitoring approach at the LTER site “Montagna di Torricchio” (Central Apennines, Italy). ARPHA Conference Abstracts 8: e155592. <https://doi.org/10.3897/aca.8.e155592>

## Abstract

Ecological monitoring recently acquired importance given the current global changes and the human impact on ecosystems. Most of research focus on investigating variation in species diversity with short-term collections of data. Other scholars use long-term data but based on resurveys with two distinct points in time. In this work, we present a different approach dealing with temporal variation of plant communities in term of alpha, beta and gamma diversity.

Data belongs to a dataset published on the journal “Data in Brief” as a data article and available on the repository “b2Share” (<https://doi.org/10.34730/044c89dc80f648d18d0ce236600b8584>). These data represent a long-lasting monitoring of 22 years with 5 monitoring sessions (2002, 2003, 2015, 2020, 2024) at the LTER site “Montagna di

Torricchio" (Central Apennines, Italy). Data were collected following a probabilistic sampling scheme based on 35 permanent plots (10 m x 10 m).

Preliminary analysis of alpha and gamma diversity (through presence/absence matrix) pointed out that the species richness is stable through years despite climatic fluctuations. Indeed, the vegetative season of 2003 had 47% less precipitation than that of 2002, and 57% less than that of 2015. Grouping the plots according to habitats (i.e., grassland, beech forest, and transition from grassland to forest) revealed that the above-mentioned pattern depends on a greater variability of grassland and transition habitats. On the contrary, beech forests show a high stability of species richness over time, probably depending on the effect of tree canopies on grass species and to buffer macroclimate extremes.

In addition, the analysis of beta diversity showed remarkable values of the turnover component over time with surprising results for the beech forest habitat. Changes in composition might evidence a pattern of change in the LTER site of Torricchio.

Nevertheless, our results suggest that 22 years of monitoring could be insufficient to make reliable inferences on long-lasting vegetation dynamics in our LTER site. This highlights the need to continue the long-term monitoring with frequent re-surveys over time.

## **Keywords**

Long-term monitoring; Permanent plots; Resurvey; Forest and grassland ecology; International Long Term Ecological Network

## **Presenting author**

Leonardo Salvatori

## **Presented at**

ORAL

## **Acknowledgements**

This research was supported by the "Montagna di Torricchio" State Nature Reserve and by the project MIMTB - Monitoraggio Integrato Multitaxon Biodiversità" - CUP J13C23000490006 - "National Biodiversity Future Center (NBFC)". NBFC comes from the National Recovery and Resilience Plan (NRRP) resources - Mission 4 "Education and research", component 2 "From research to business" - investment line 1.4 "Strengthening

research structures and creation of national R&D champions on some key enabling technologies"; funded by the European Union-Next Generation EU.

### **Conflicts of interest**

The authors have declared that no competing interests exist.