# Comparing C and N stable isotopes analysis between urban and peri-urban Mediterranean parks along a latitudinal transect

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As one of the most vulnerable areas on our planet, Mediterranean region represents a hotspot for climate change and biodiversity. Prolonged droughts and heatwaves are increasingly affecting water availability, which is crucial for the resilience and adaptation of the local vegetation. For over 10,000 years, human activities such as agriculture, urbanization, and deforestation have altered the Mediterranean landscape. Understanding the response of the vegetation to the dynamics between natural and human induced changes is essential for conservation and management efforts. Mediterranean vegetation responds differently to environmental changes and anthropogenic pressure such as urbanization and the related stressors. Even within the same species, different compartments (e.g. leaves, roots, and branches) may exhibit diverse responses to these stressors and can be used as valuable bioindicators. Stable isotopes, particularly carbon (C) and nitrogen (N), have been widely used as powerful tools to investigate plant responses to environmental gradients such as plant water-use efficiency, nitrogen-use strategies and ecosystem functioning.

In this study, conducted within ITINERIS (Italian integrated environmental research infrastructures system) project, we present preliminary results of a comparison between δ13C and δ15N values in soil and vegetation samples of coastal Mediterranean urban and peri-urban parks along a latitudinal gradient in Italy. To assess the relationship between isotopic signatures and environmental changes, soil and vegetation from the most abundant evergreen and broadleaf species were collected in three different ICOS (Integrated Carbon Observation System) stations located along the coastal latitudinal transect (Pisa, Rome and Naples). Holm oak (*Quercus ilex*) was chosen as potential bioindicator of environmental changes and anthropogenic disturbances, since abundantly present in all the three sites. Soil and plant compartments (e.g., leaves of different ages, branches, pollen, fine roots) were collected and analysed at the beginning and at the end of the growing season to investigate and provide insights on the response of Mediterranean species up to organ level to thermo-pluviometric gradients.

The main findings of this study so far, have underlined differences in C and N concentrations and isotope compositions along the latitudinal gradient and seasons. Capodimonte, the most southern site, reveals an enrichment in δ13C and δ15N in leaves compatible with a response to hot and dry climate, and a much higher degree of anthropization. Castel Porziano shows a similar trend but with lower δ15N and N concentration. San Rossore, the most northern site, appears to be less exposed to summer water stress and consequently shows more diluted δ13C and δ15N values. Leaves during the fall showed higher d13C and N concentration compared to spring. Branches were about 1 ‰ enriched in 13C compared to leaves due to post-photosynthetic isotope fractionations. Further analyses are in progress on other plant compounds, including pollen extracts and soil samples, to identify the most suitable bioindicators of Mediterranean species response to climate change and human impact and consequently, potential applications in management and conservation strategies in the region.