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5. = WOODY FLORA DISTRIBUTION PATTERNS ALONG A LONGITUDINAL TRANSECT IN CENTRAL ITALY: A TRAIT-BASED ANALYSIS

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INTRODUCTION

Analysis of floristic and vegetation data by means of **trait-based approaches** has assumed recently increasing interest in both theoretical and applied biodiversity science (1). By using species traits (2) instead of their identities, these approaches improve the ability to assess traits response to environmental gradients (3).
For Italy, at a medium scale, **native woody flora** is an important **biodiversity surrogate** (4); recently, the analysis of native woody genera distribution patterns added useful insight into Italy's biogeographic structure, evidencing latitudinal and longitudinal gradients (5).
In central Italy, analysis of woody units distribution patterns along a west-east transect at a semi-detailed scale evidenced clear gradients mainly related to elevation and identified woody floristic types (6).
We present a **trait-based analysis** of woody flora distribution patterns along the same **longitudinal transect** in central Italy. Starting from the dataset used in Latini et al. (6), **we want to assess woody flora traits response to environmental variables along this transect.**

MATERIALS AND METHODS

Study area is located in the **central part of peninsular Italy**, namely in the Lazio and Abruzzo administrative regions; the **157 km long transect** ranges from Tyrrhenian to Adriatic Sea and intercepts Appennine chain (transect elevation range = 5-1840 m a.s.l) (Fig. 1).
The dataset contains the **presence/absence of 141 woody units** (species and subspecies) in **153 sites** (representing table L). Units are described by **14 traits** (representing table Q): life form, spinescence, 4 leaf traits, 3 flower traits, 3 fruit traits, pollination and dispersal modes. **10 environmental variables** have been measured in the sites (representing table R): elevation, distance from the sea, longitude and 7 bioclimatic variables.
To assess traits response to environmental gradients, **RLQ analysis and fourth-corner methods** were used, following the approach by Dray et al. (3): fourth-corner tests were applied on the outputs of RLQ analysis and significant associations between RLQ axis and traits and/or environmental variables were represented on the RLQ factorial map and as a table.

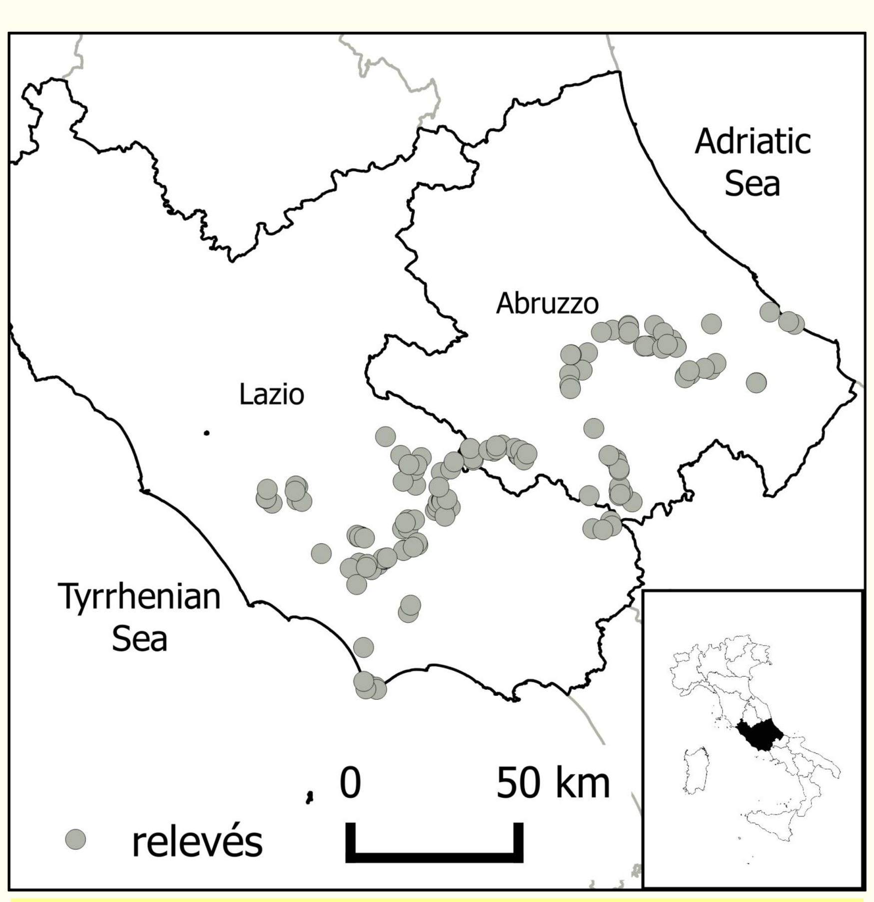

Fig. 1 – Study area.
Dots represent the 153 relevés along the 157 km long transect.

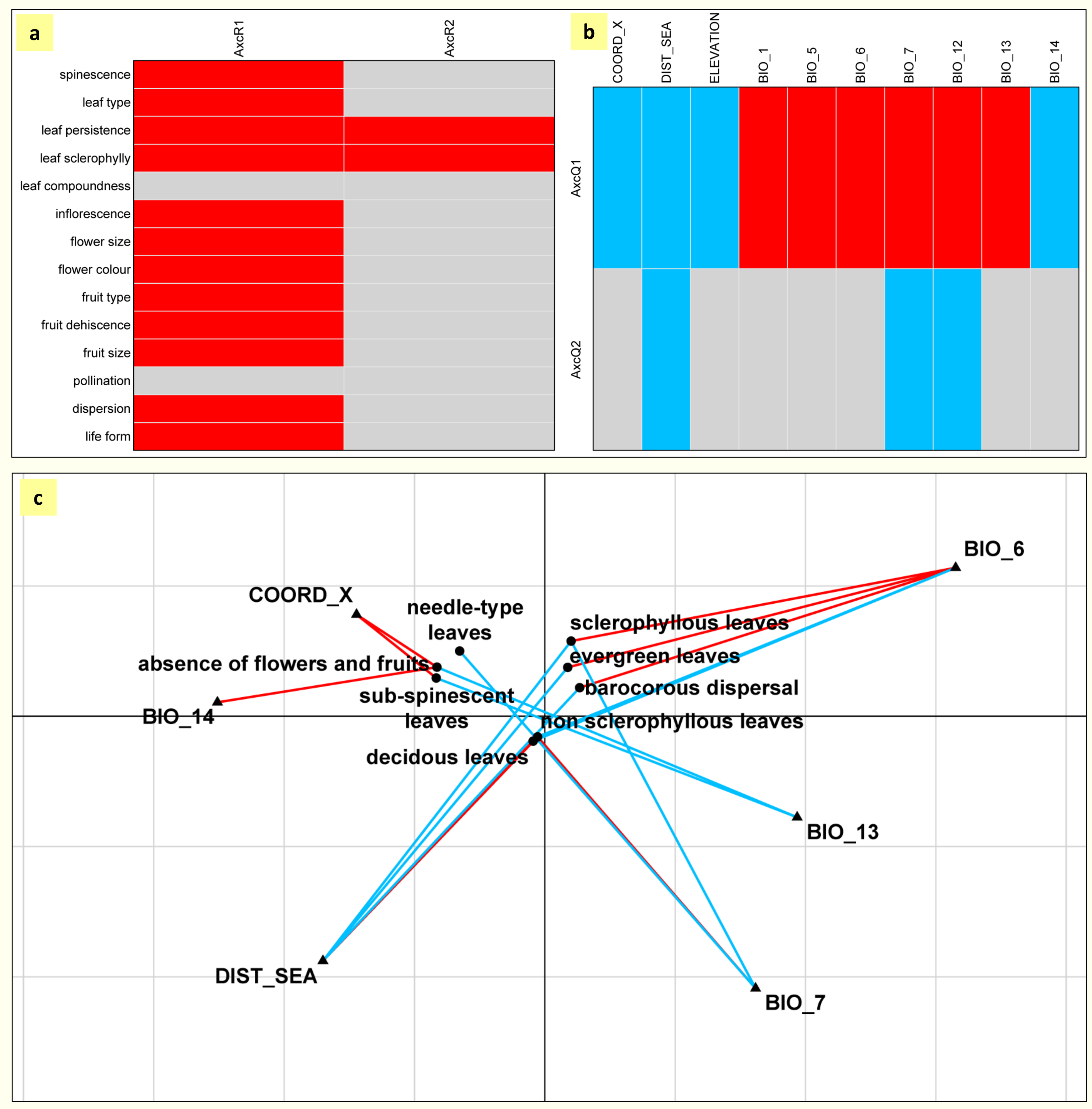

Fig. 2 – RLQ analysis and fourth-corner tests results.
a) Fourth-corner tests between the first two RLQ axes for environmental gradients (AxR1/AxR2) and traits.
b) Fourth-corner tests between the first two RLQ axes for trait syndromes (AxQ1 and AxQ2) and environmental variables.
c) Representation of significant (P < 0.05) associations identified by the fourth-corner method on the factorial map of RLQ analysis.
Positive significant associations are represented by red cells and lines, and negative significant associations by blue ones.
Abbreviations: longitude (COORD_X), distance form the sea (DIST_SEA), annual mean temperature (BIO_1), maximum temperature of the warmest month (BIO_5), minimum temperature of the coldest month (BIO_6), annual temperature range (BIO_7), annual precipitation (BIO_12), precipitation of the wettest month (BIO_13), and precipitation of the driest month (BIO_14).

RESULTS

A global relationship between species traits and environmental variables has been detected (Fig. 2).
The **first RLQ axis** is significantly negatively correlated with elevation, precipitation of driest month, distance from the sea and longitude, and positively with annual mean temperature, max temperature of warmest month, min temperature of coldest month, temperature annual range and precipitation of wettest month. **High elevation inland sites**, located on the east Adriatic side (with high values of min precipitation of driest month and low values of max precipitation of wettest month), are characterized by reptant phanerophytes, subspinescent leaves and absence of flowers and fruits. **Low elevation coastal sites** (with high values of min temperature of coldest month) are characterized by evergreen taxa, sclerophyllous ones, modified leaves, little fruits and barocorous dispersal.
The **second RLQ axis** is significantly negatively associated with distance from the sea, temperature annual range and annual precipitation. **Middle elevation inner sites** (with high values of annual temperature range) are characterized by non-sclerophyllous taxa and deciduous ones.

CONCLUSIONS

In the analyzed area, highly heterogeneous in environmental terms, the used combined approach was able to identify clear **traits-environmental patterns**.
As highlighted in other studies, the use of traits instead of taxa identities could be useful also for monitoring analysis.
Next step will be to apply this approach to different databases at different scales.

REFERENCES

1) S. Diaz, J. Kattge, ..., L.D. Gorné (2016) Nature, 529, 167-171
2) C. Violle, M-L. Navas, D. Vile, E. Kazakou, C. Fortunel, I. Hummel, E. Garnier (2007) Oikos, 116, 882-892
3) S. Dray, P. Choler, S. Dolédec, P.R. Peres-Neto, W. Thuiller, S. Pavoine, C.J.F. ter Braak (2014) Ecology, 95(1), 14-21
4) G. Abbate, S. Bonacquisti, S. Burrascano, E. Giovi, A. Giuliani, F. Pretto, E. Scassellati (2015) Plant Biosyst. 149(3), 565-573
5) G. Abbate, E. Scassellati, S. Bonacquisti, M. Iberite, M. Latini, A. Giuliani (2016) Botany 94, 533-542
6) M. Latini, M. Iberite, G. Abbate (submitted)