

Geographical shifts in the successional dynamics of inland dune shrub communities

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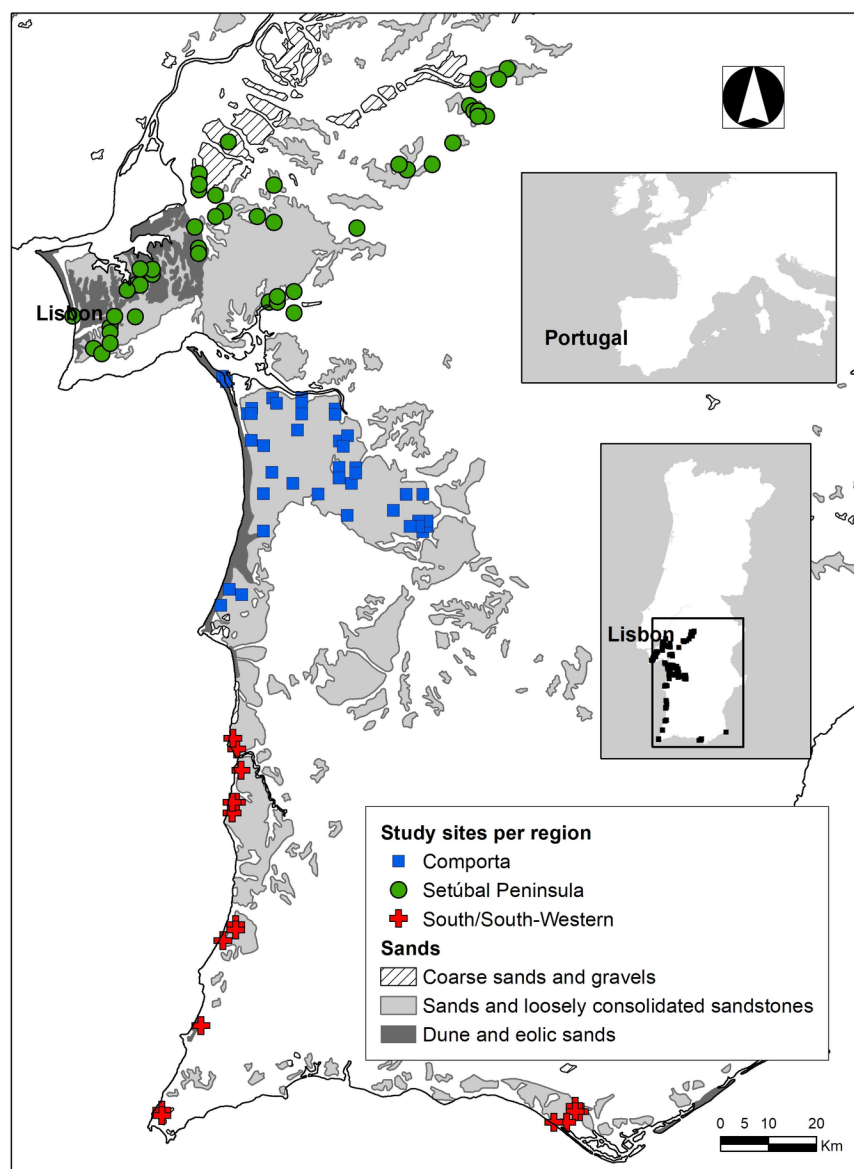
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Abstract

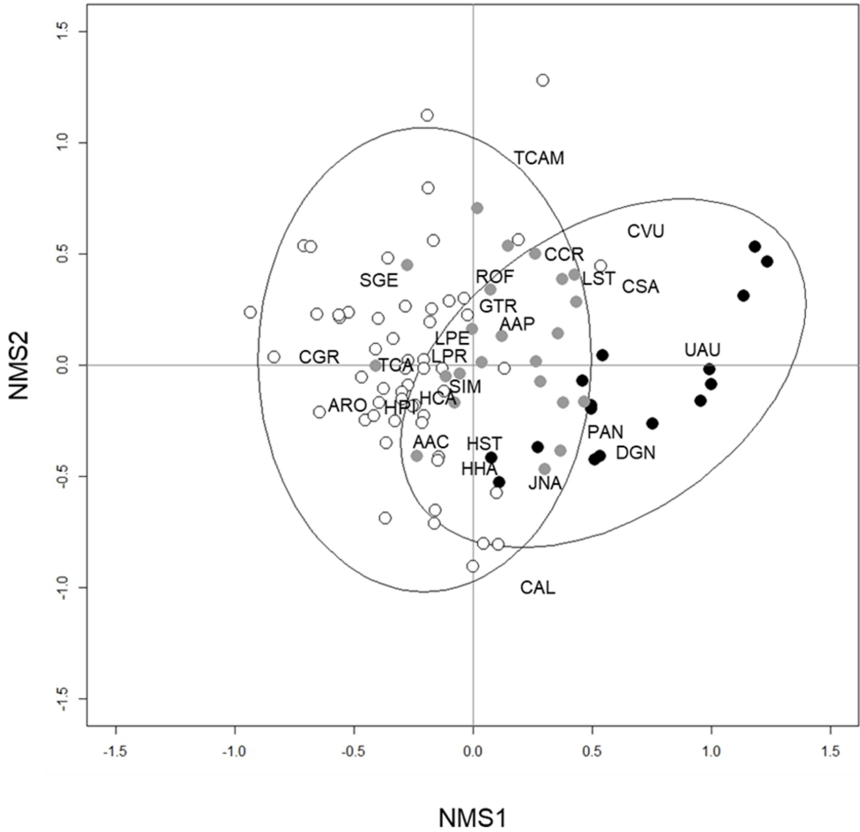
Aim: Species' environmental requirements and large-scale spatial and evolutionary processes are known to determine the structure and composition of local communities. However, ecological interactions and historical processes also have major effects on community assembly at landscape and local scales. In this work we evaluate whether two xerophytic shrub communities follow fixed ecological assembly dynamics throughout large geographical extents, or their composition is rather driven by species individualistic responses to environmental and macroecological constraints. **Location:** SW Iberian Peninsula (Portugal and Spain) **Taxa:** *Stauracanthus genistoides* agg. and *Ulex australis* agg. (Fabaceae). **Methods:** Inland dune xerophytic shrub communities were sampled in 95 plots distributed within their potential area of occurrence. Then, we described the main gradients of vegetation composition and assess the relevance of biotic interactions. We also characterized the habitat suitability of the dominant species, *S. genistoides* and *U. australis*, to map the potential distribution of the xerophytic shrub communities. Finally, to identify the relative importance of each factor driving changes in community composition, we examined the relationships between the vegetation gradients and a broad set of explanatory variables. **Results:** Our results show that xerophytic shrubs follow uniform successional patterns throughout the whole geographical area, but also that these communities respond differently to the main environmental gradients in each region. Soil organic matter is the main determinant of community variations in the northern regions, Setúbal Peninsula and Comporta, while in the South/South-Western region most of the variation between both types of communities is explained by temperature seasonality. **Main conclusions:** The relative importance of the main factors causing community-level responses varies according to regional processes and the suitability of the environmental conditions for the dominant species in these communities. These responses are also determined by intrinsic community mechanisms that result in a high degree of similarity in the gradient-driven community stages in different regions.

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Data	Analyses	Phenomenon	Interpretation
<ul style="list-style-type: none">95 Sites/plots25 Shrub species	 Ordination of shrub assemblages (NMS)	Compositional gradients	Xerophytic shrub community dynamics
	C-score	Community co-occurrence	Relevance of biotic interactions (competition)
<ul style="list-style-type: none">GIS environmental variablesShrub species occurrence records	 Habitat Suitability of dominant species (ENFA)	Abiotic niche-based species responses	Potential distributions of dominant species of xerophytic shrub communities in the Iberian Peninsula
<ul style="list-style-type: none">Soil organic matter (local)Habitat Suitability (Regional)Environmental variables (Regional)	 Spearman correlations, GAMs, model selection and Vector fitting*	Main drivers of community composition	Geographical variations in the effect and importance of local and regional drivers of community assembly



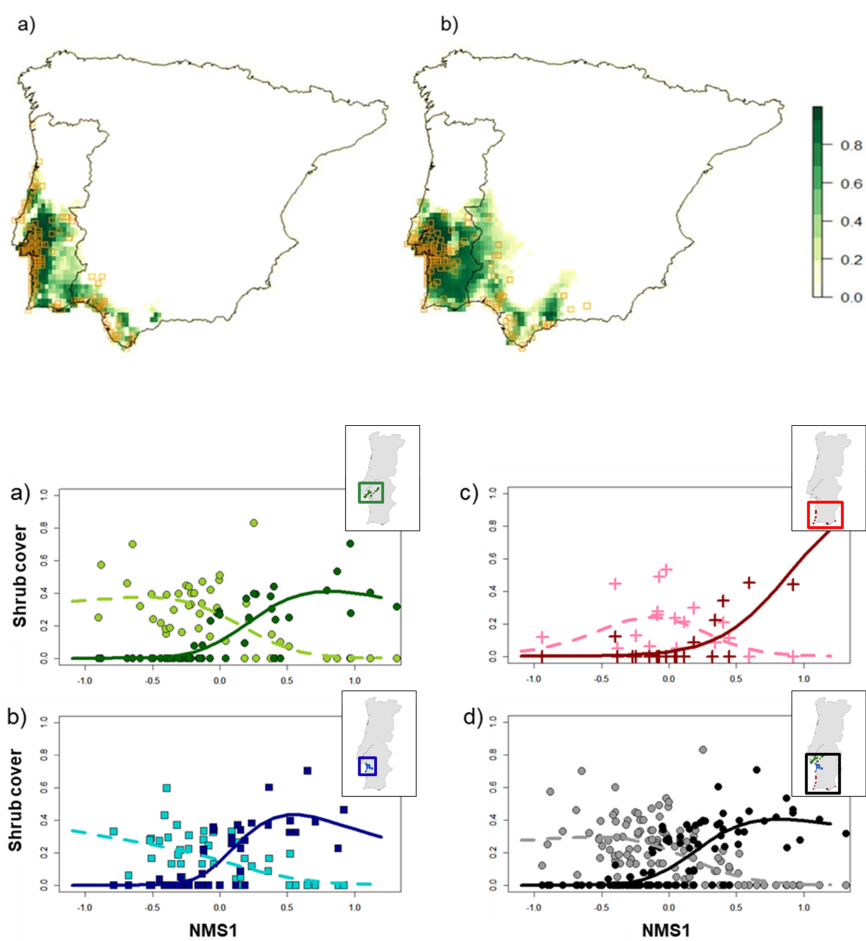


Table 1 ENFA results of *Stauracanthus genistoides* and *Ulex australis* with the 6 more informative variables (after variable selection).

	scores SGE		scores UAU	
	Mar	Spe1	Mar	Spe1
Annual Mean Temperature	0.51	0.10	0.56	0.06
Annual Precipitation	0.02	-0.12	-0.03	-0.23
Isothermality	0.49	0.00	0.52	-0.10
Average Monthly Radiation	0.07	-0.98	0.05	0.25
Mean Temperature of Wettest Quarter	0.24	-0.08	0.21	-0.88
Temperature Seasonality	-0.66	-0.06	-0.61	-0.31
Marginality:	5.29		4.09	