ARPHA Conference Abstracts 8: e148149
doi: 10.3897/aca.8.e148149

Conference Abstract

Promoting Landscape Heterogeneity in Silvopastoral Systems through Very High-Voltage Power Line Pylons: An Unconventional Approach

Mariana P. Fernandes[‡,§], Paula Matono[|], Carla Pinto-Cruz[|], Erika Almeida[‡], Alice Nunes[§], Anabela D.F. Belo[|], Francisco Moreira[¶,#,¤]

‡ MED – Mediterranean Institute for Agriculture, Environment and Development & CHANGE – Global Change and Sustainability Institute, Institute for Advanced Studies and Research, Universidade de Évora, Pólo da Mitra, Ap. 94, 7002-554, Évora, Portugal
§ cE3c - Center for Ecology, Evolution and Environmental Changes & CHANGE - Global Change and Sustainability Institute, Faculdade de Ciências, Universidade de Lisboa, 1749-016, Lisboa, Portugal
| MED – Mediterranean Institute for Agriculture, Environment and Development & CHANGE – Global Change and Sustainability Institute, Departamento de Biologia, Universidade de Évora, Pólo da Mitra, Ap. 94, 7002-554, Évora, Portugal
¶ CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado Campus de Vairão, Universidade do Porto, 4485-661, Vairão, Portugal
# CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado Instituto Superior de Agronomia, Universidade de Lisboa, Tapada da Ajuda, 1349-017, Lisboa, Portugal
¤ BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO, Campus de Vairão, 4485-661, Vairão, Portugal

Corresponding author: Mariana P. Fernandes (mpfernandes@uevora.pt)

Received: 28 Jan 2025 | Published: 28 May 2025

Citation: Fernandes MP, Matono P, Pinto-Cruz C, Almeida E, Nunes A, Belo ADF, Moreira F (2025) Promoting Landscape Heterogeneity in Silvopastoral Systems through Very High-Voltage Power Line Pylons: An Unconventional Approach. ARPHA Conference Abstracts 8: e148149. https://doi.org/10.3897/aca.8.e148149

Abstract

Mediterranean silvopastoral systems (*Montado* in Portugal or *Dehesa* in Spain) are considered High Nature Value farmlands with sustainable and low-intensity human use that unite forestry and livestock production, being characterized by a habitat mosaic that combines natural and semi-natural grasslands, a tree layer with different densities of *Quercus* spp. (mainly *Q. suber* or *Q. rotundifolia*, or both) and singular landscape elements (e.g. small shrublands, small rocky outcrops, temporary ponds, and watercourses with riparian galleries). Singular landscape elements are crucial to ecosystem services' functioning by providing habitat heterogeneity and connectivity that support species' life cycles and sustain ecological networks. As the management of

Mediterranean silvopastoral systems intensifies, with overgrazing threatening the maintenance of singular landscape elements, these systems' functionality and high biodiversity are compromised.

Designing restoration solutions tailored to the farmland context could be a helpful strategy to offset the landscape simplification and multifunctionality loss of the silvopastoral systems. Very high-voltage power line pylons, widespread also trough farmlands, can be handled as an artificial singular landscape element by using their base surface to promote native vegetation and provide an opportunity to restore landscape heterogeneity and connectivity to plants and some fauna. The area under very high-voltage pylons is negligible for agricultural or grazing uses and challenging to access by machinery, being frequently left unmanaged and, therefore, available to apply restoration solutions without compromising the landowner's productivity and profitability. Our study tested the hypothesis that vegetation under very high-voltage pylons can be restored to create elements of heterogeneity in grazing systems. We tested two restoration solutions: a passive one by grazing exclusion and an active one that combines grazing exclusion with a native seed mix application. We aimed to assess these restoration solutions' effectiveness in recovering Mediterranean vegetation patches under very high-voltage pylons and their effects on the plant community's composition, diversity and vertical structure.

The study, carried out over five years, took place in southern Portugal under 15 very high-voltage pylons (plots of 48m^2) distributed in Mediterranean silvopastoral systems grazed by cattle. We fenced 10 plots in autumn 2017: five to Passive Restoration by excluding cattle grazing and promoting natural regeneration, and five to Active Restoration by sowing a seed mix of herbaceous and shrub native species. We also established five plots as control (No Intervention). We surveyed the vegetation and assessed the plants' abundance and the mean vegetation height before (spring 2017) and after the intervention (spring 2018-2021). We evaluated the species richness, Shannon index diversity, vertical structure (vegetation mean height) and the dissimilarity of the community composition between the pre- and post-intervention periods.

The restoration solutions increased plant communities' heterogeneity at the landscape level by establishing plant communities underneath very high-voltage pylons that contrast in plant composition and vegetation vertical structure with the surrounding grassland. Although more time-consuming and expensive, the active restoration solution increased species richness and maintained species diversity locally. In contrast, the passive restoration solution, at the local scale, maintained species richness but decreased species diversity. The bases of very high-voltage pylons can effectively be used to create singular landscape elements in grazed systems and may serve as stepping stones between remnants of natural vegetation. Using the bases of very high-voltage pylons to promote native vegetation and increase landscape heterogeneity can be a complementary strategy to offset the adverse effects of overgrazing in silvopastoral systems and a new approach to bring natural elements into agricultural landscapes, as shown in our pilot essay.

Keywords

Singular landscape elements, Ecological Restoration, Mediterranean, Montado, Connectivity

Presenting author

Mariana P. Fernandes

Presented at

ORAL

Acknowledgements

We thank the support of the project “LIFE LINES – Linear Infrastructure Networks with Ecological Solutions” (LIFE14 NAT/PT/001081), from the European Union LIFE Program. MED (https://doi.org/10.54499/UIDB/05183/2020; https://doi.org/10.54499/UIDP/05183/2020), CHANGE (https://doi.org/10.54499/LA/P/0121/2020), and Ce3C (https://doi.org/10.54499/UIDB/00329/2020).

Funding program

This work is funded by National Funds through FCT–Foundation for Science and Technology under the Project UIDB/05183. Mariana P. Fernandes is funded by National Funds through FCT–Foundation for Science and Technology under the PhD grant 2020.06339.BD.

Conflicts of interest

The authors have declared that no competing interests exist.