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Italiadomani
PIANO NAZIONALE DI RIPRESA E RESILIENZA

NATIONAL BIODIVERSITY FUTURE CENTER

A multi-taxa approach to assess the impacts of the alien *Carpobrotus* spp. on natural communities on a small Mediterranean island

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4th Mediterranean Plant Conservation Week
VALÈNCIA | 23-27 OCTOBER | 2023

UNIVERSITÀ DEGLI STUDI FIRENZE

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Introduction

- One of the most invasive plant species in the Mediterranean
- Particularly important in island contexts (effects of the invasion process are particularly unpredictable in a limited geographical area)
- Threatens many priority habitats (e.g., halo-nitrophilous scrubs, and low formations of *Euphorbia* close to cliffs)
- Complexity of its management and removal

Biol Invasions
https://doi.org/10.1007/s10530-023-03059-7

ORIGINAL PAPER

(Not) sweeping invasive alien plants under the carpet: results from the use of mulching sheets for the control of invasive *Carpobrotus* spp.

Lorenzo Lazzaro · Michele Mugnai · Giulio Ferretti · Francesca Giannini · Michele Giunti · Renato Benesperi

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Introduction

- Impacts on plants are widely recognised while those on other communities are poorly studied
- Few studies suggest a complex interaction between *Carpobrotus* spp. and invertebrates

Biodiversity and Conservation (2021) 30:497–518
https://doi.org/10.1007/s10531-020-02102-6

ORIGINAL PAPER

Impacts of the removal of invasive *Carpobrotus* on spider assemblage dynamics

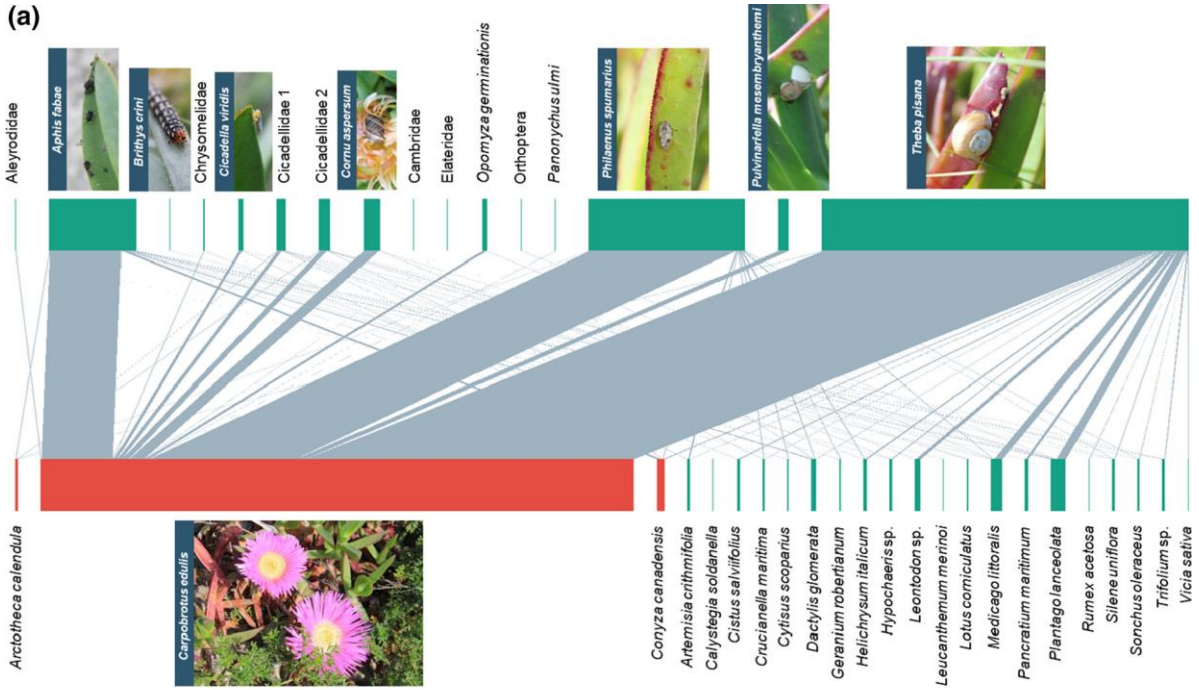
Julie Braschi[1,2,3] · Ophélie Hélard[1] · Christophe Mazzia[1] · Pierre Oger[4] · Philippe Ponel[1] · Elise Buisson[1,3]

Biol Invasions (2021) 23:1425–1441
https://doi.org/10.1007/s10530-020-02449-5

ORIGINAL PAPER

Impacts of the invasive plant *Carpobrotus edulis* on herbivore communities on the Iberian Peninsula

Jonatan Rodríguez · Adolfo Cordero-Rivera · Luís González



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Introduction

- Impacts on plants are widely recognised while those on other communities are poorly studied
- Few studies suggest a complex interaction between *Carpobrotus* spp. and invertebrates
- It produces a strong modification in soil structure, chemistry, and fluxes of nutrients

Plant Soil (2016) 409:19–34
DOI 10.1007/s11104-016-2924-z

REGULAR ARTICLE

The impact of *Carpobrotus* cfr. *acinaciformis* (L.) L. Bolus on soil nutrients, microbial communities structure and native plant communities in Mediterranean ecosystems

Emilio Badalamenti · Luciano Gristina · Vito Armando Laudicina · Agata Novara · Salvatore Pasta · Tommaso La Mantia

Contents lists available at ScienceDirect
Science of the Total Environment
journal homepage: www.elsevier.com/locate/scitotenv

Effects of *Carpobrotus edulis* invasion on soil gross N fluxes in rocky coastal habitats

Cristina Vieites-Blanco [a,b], Serafín J. González-Prieto [a,*]

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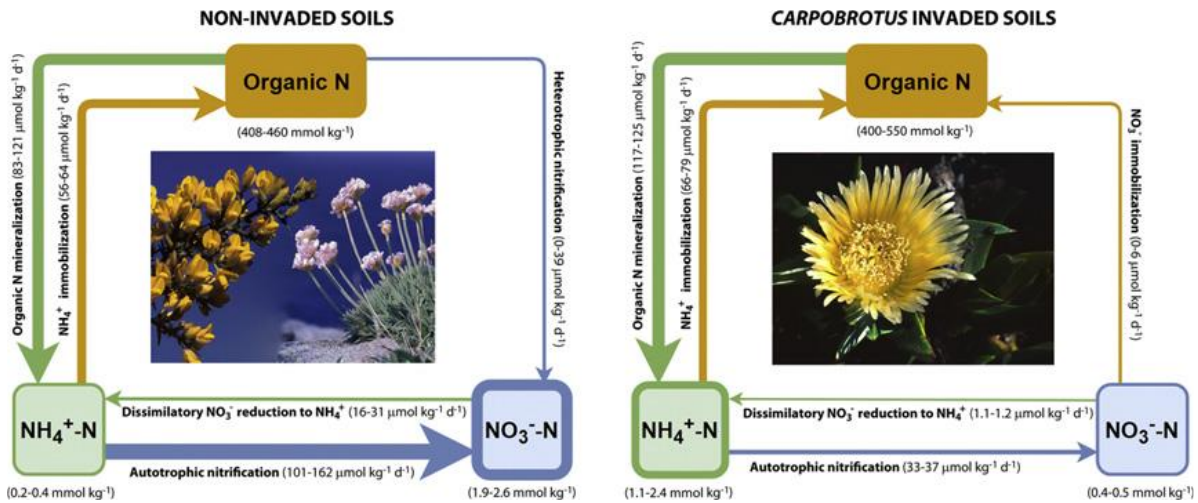

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Research questions

1) Does *Carpobrotus* spp. impact negatively the diversity of plant and animal communities?
2) How does removal and mulching influence the recovery of natural communities?
3) How different are soil parametres in areas where invasion and eradication occurred?

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Methods

- Giglio Island in Tuscan Archipelago, central Italy
- *Carpobrotus* spp. occur along most of the perimeter of the island where it invades natural habitats of conservation interest (e.g. N2000 habitats coded 1430 = Halo-nitrophilous scrubs (*Pegano-Salsoletea*) and 5320 = Low formations of *Euphorbia* close to cliffs)
- *Carpobrotus* spp. was locally eradicated in 2022 within the LIFE project 'LETSGO GIGLIO'

LETSGO GIGLIO
ENGAGING WITH BIODIVERSITY

Artemisia arborescens

Helichrysum litoreum

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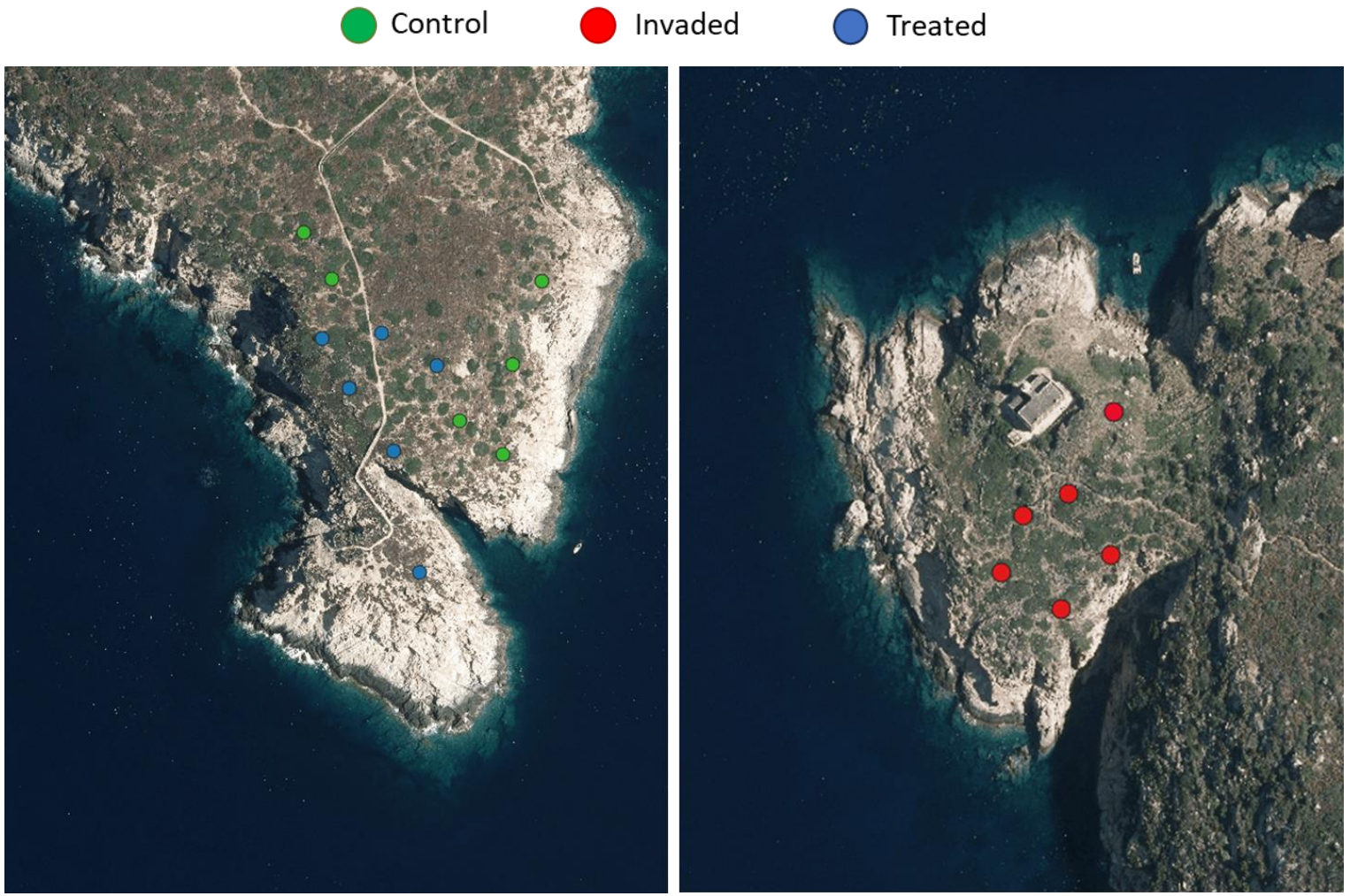
Methods

- A total of **18 randomly placed points** in a **mosaic of habitats** 1430 and 5320
- 6 in **invaded** patches, 6 in patches where *Carpobrotus* sp. was **eradicated**, and in 6 **control** patches
- **4 m² plots** in which we surveyed following communities:
  - **vascular plants**
  - **bryophytes**
  - **ants**
  - **molluscs**
  - **soil fauna**
- Analyses on **species composition** (NMDS) and **diversity indices** (species richness and Shannon index)
- **Soil samples** for physical and chemical analyses



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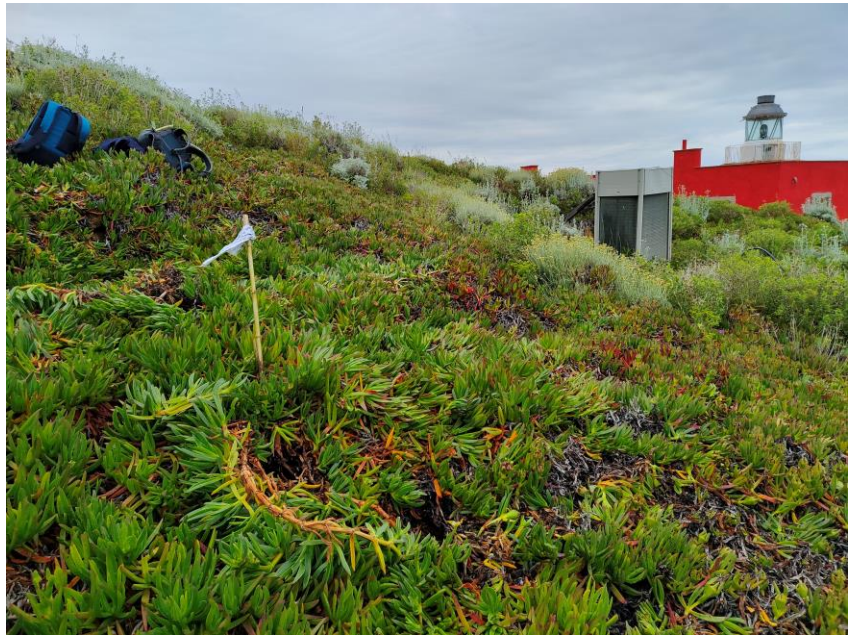
Methods

TREATED



INVADED

CONTROL

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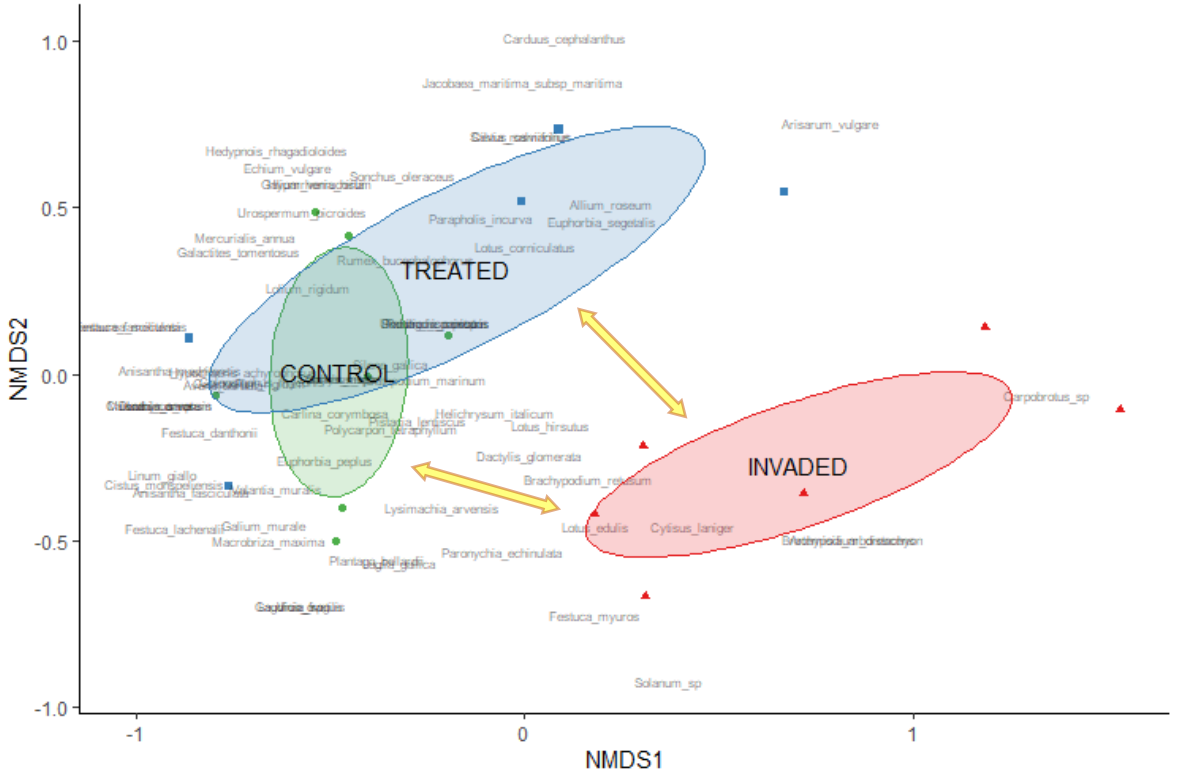
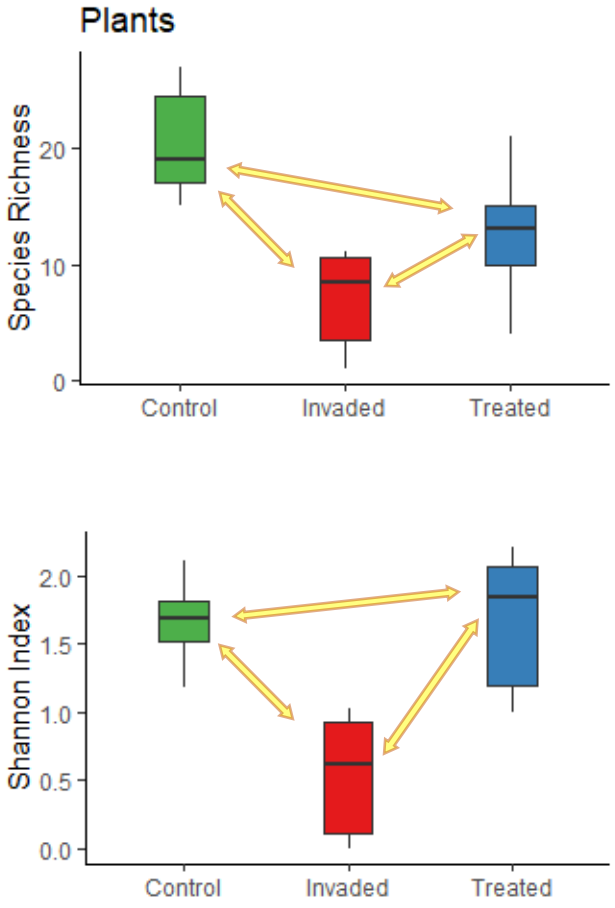
Results - Plants

- Invaded areas showed different species composition: more nitrophilous species in invaded patches
- The 3 types of communities present different levels of diversity: invaded areas have less species





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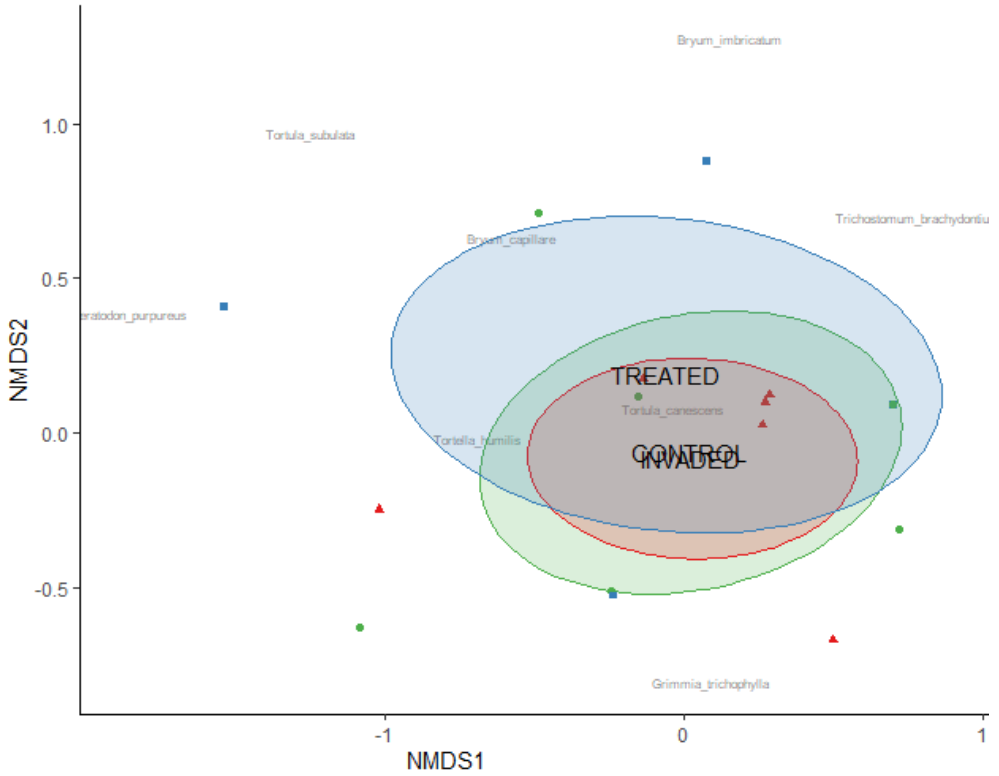
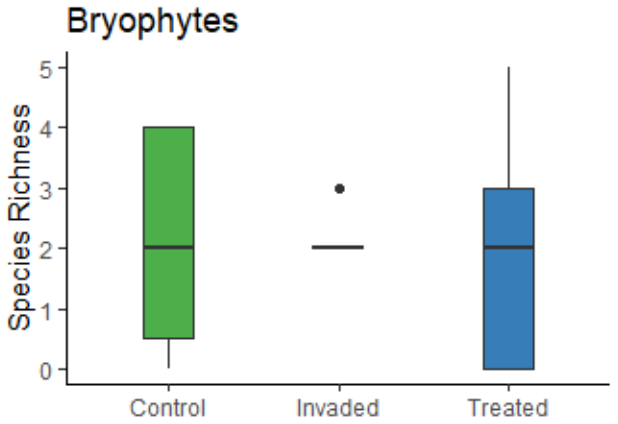
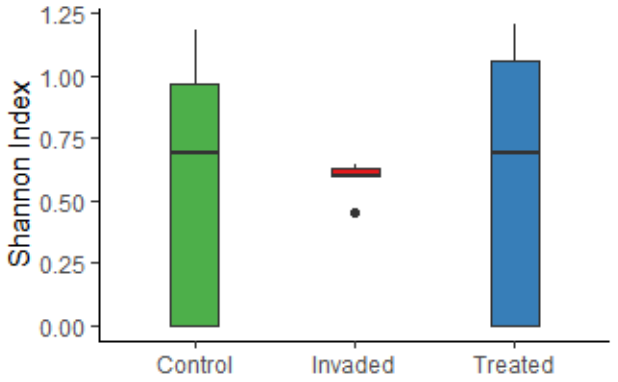
Results - Bryophytes

- Flora of bryophytes is naturally poor in these habitats
- *Carpobrotus* spp. might enhance soil umidity which is favourable for bryophytes, while its litter might have a negative effect
- No significant differences in composition and diversity indices







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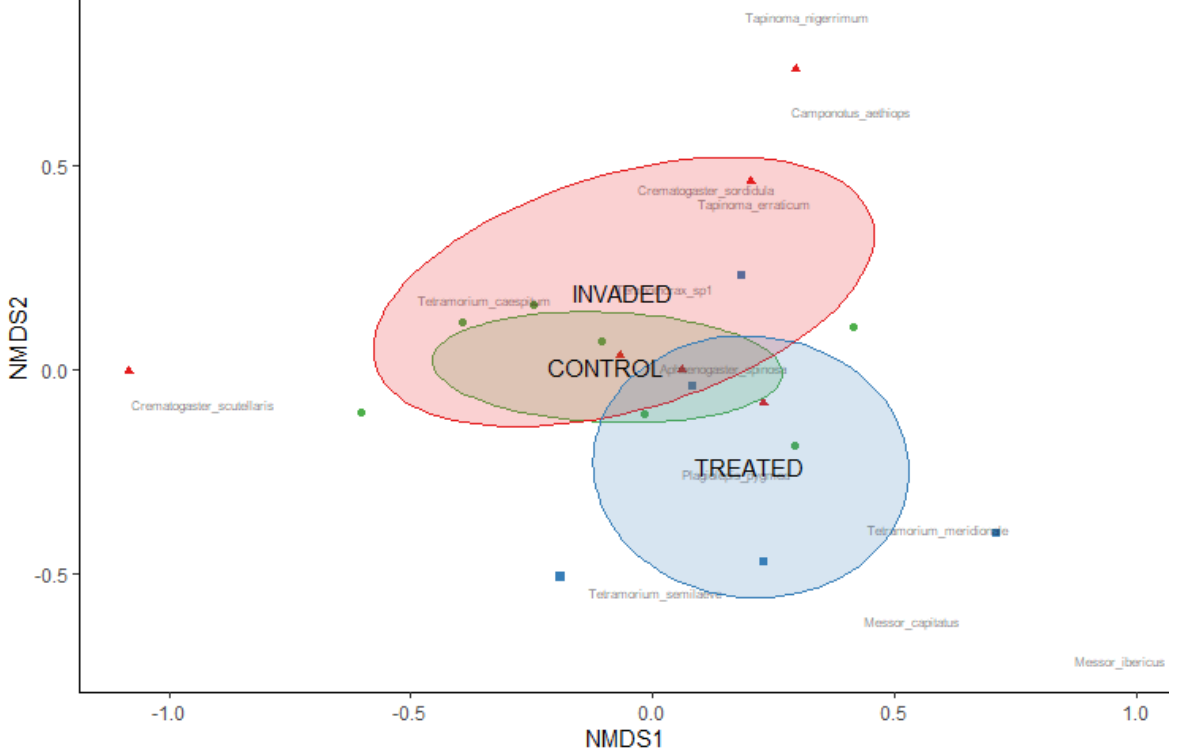
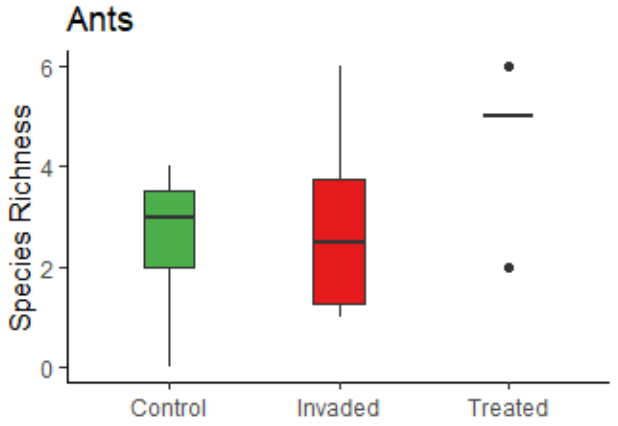
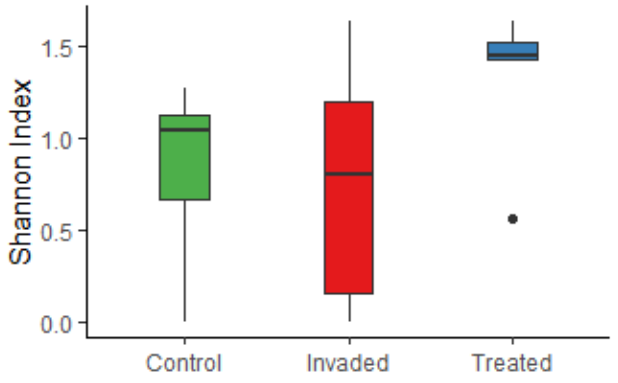
Results - Ants

- *Carpobrotus* spp. mat and its litter might represent microhabitats for some ant species
- No significant differences in composition and diversity indices







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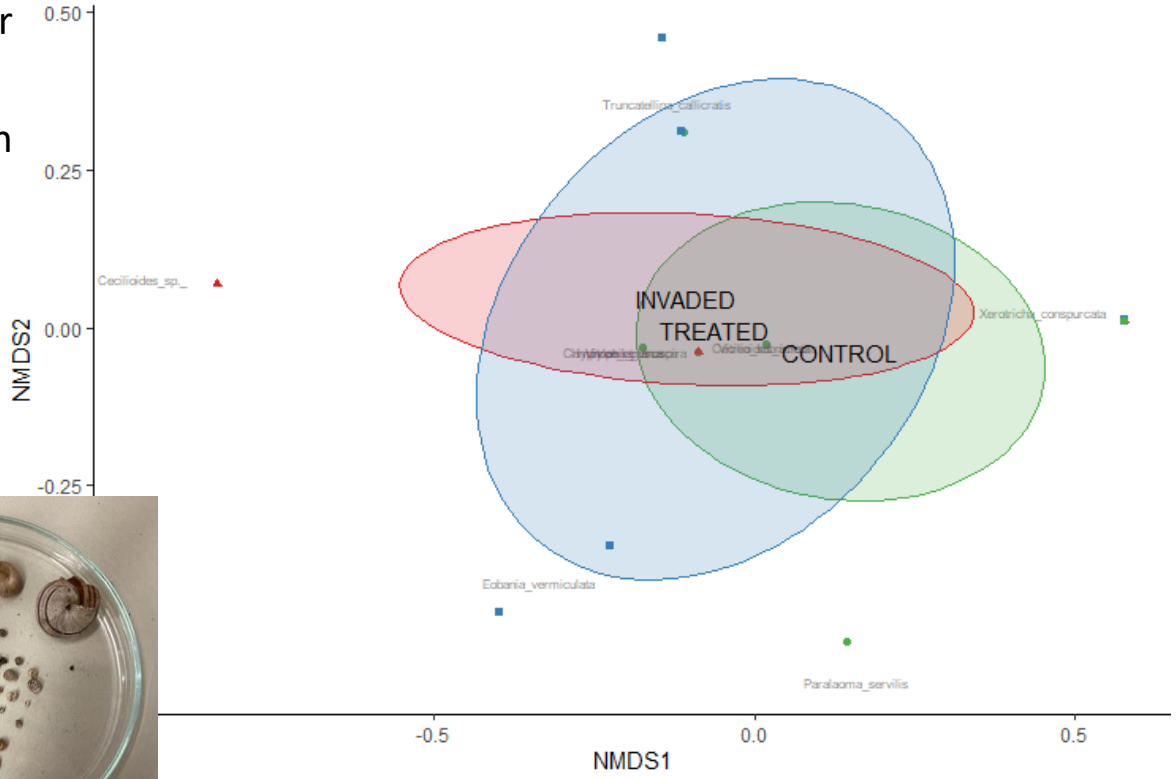
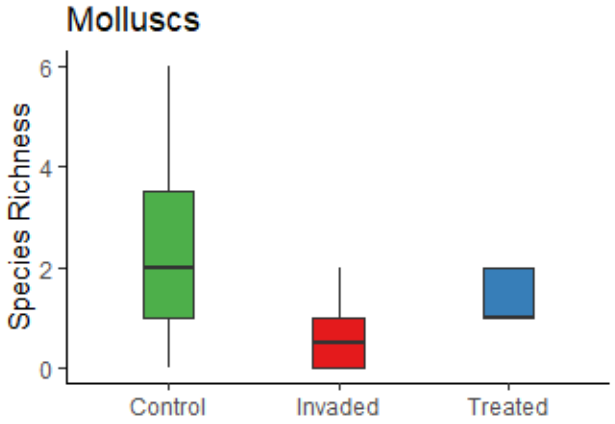
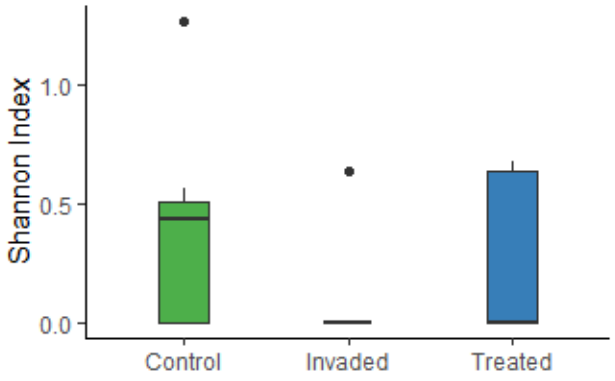
Results - Molluscs

- *Carpobrotus* spp. mat or litter might enhance umidity and favour molluscs
- No significant differences in composition and diversity indices







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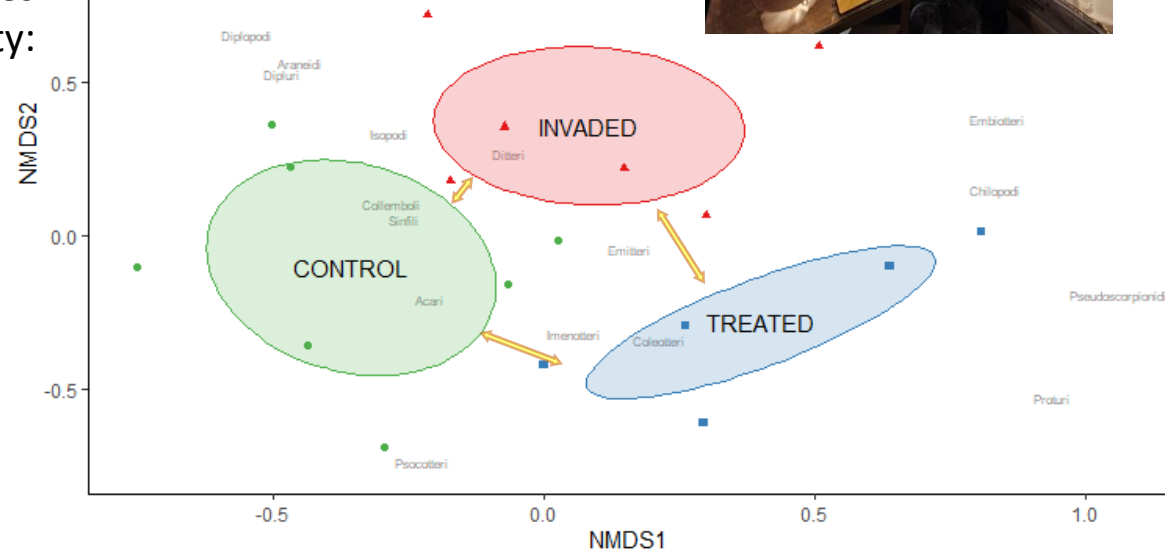
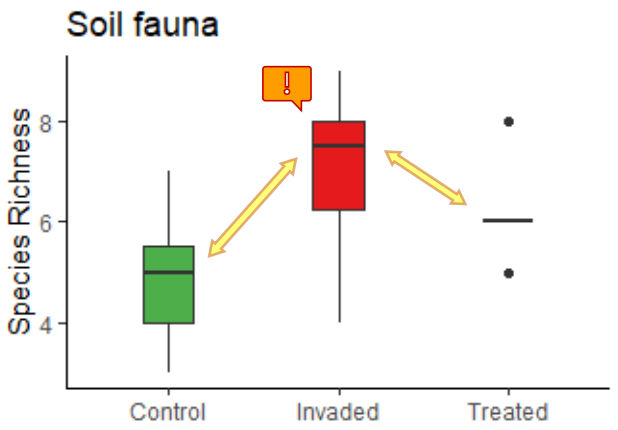
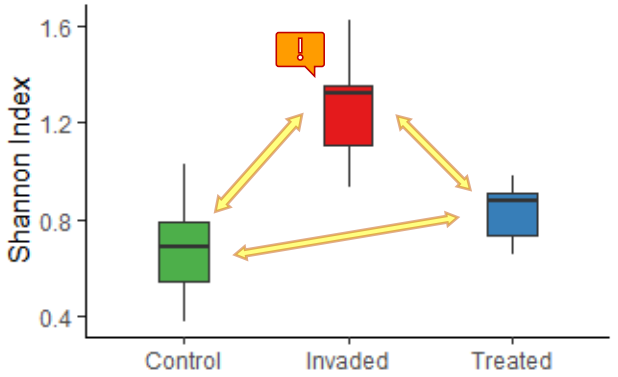
Results – Soil fauna

- Soil fauna is naturally poor in these habitats
- Compositional shift among the different types
- The 3 types of communities present different levels of diversity: invaded areas had less species







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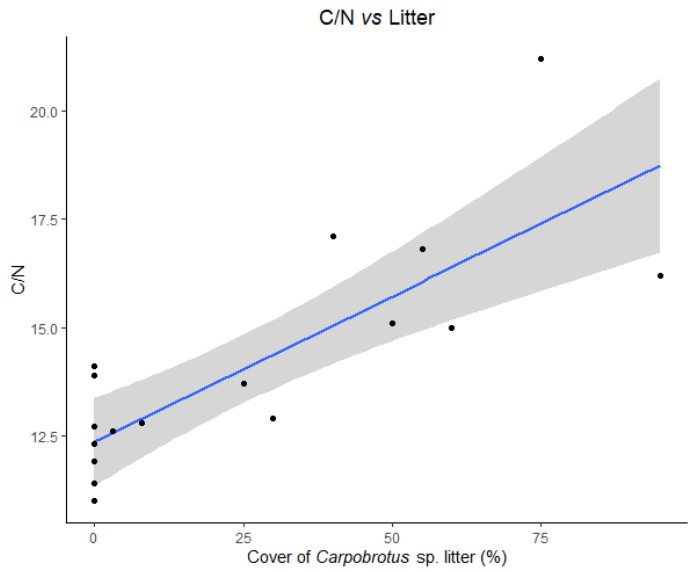
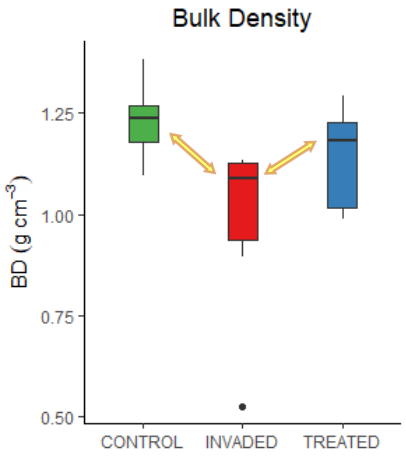
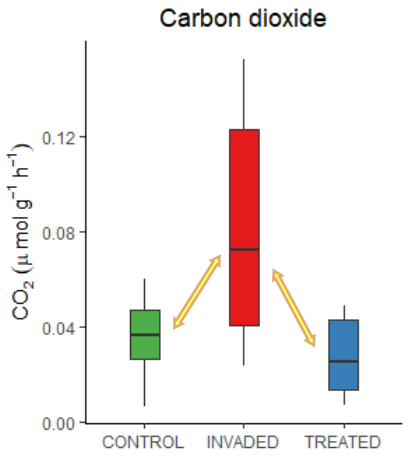
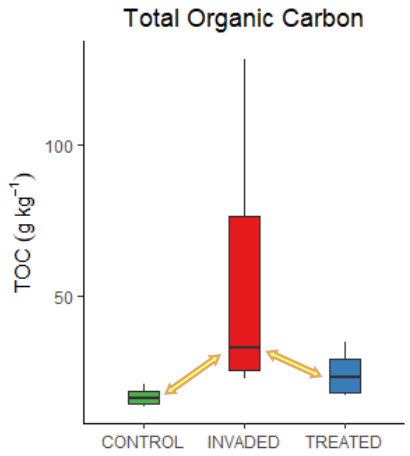
Results – Soil parametres

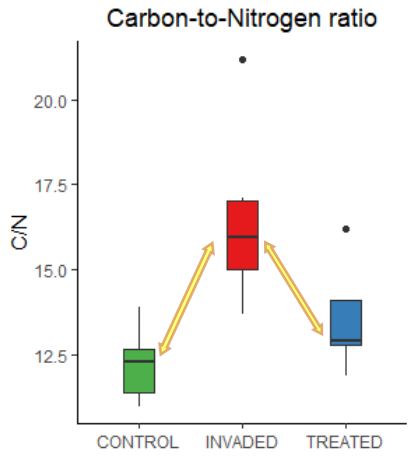
- Impacts on physical and chemical paramatres of soil
- Those habitats are naturally characterised by thin soils and rock outcrops, and poor of nutrients
- *Carpobrotus* spp. induces the formation of soil and increases the amount of nutrients
- Effects of the *Carpobrotus* spp. mat and its litter persist after the removal











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Conclusions

- *Carpobrotus* spp. affects negatively vascular vegetation but has slight effects on invertebrate communities
- Soil fauna and chemical/physical parametres are altered
- Mulching treatment allows a recovery of natural vegetation and has minimal effects on animal communities

Future perspectives

- Check for impacts on soil microbiota
- Assess the temporal changes of communities after eradication

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Thank you for your attention!

Lorenzo Lazzaro[1], Alice Misuri[1,2], Eugenia Siccardi[1], Elena Tricarico[1,2], Sara Forni[1,2], Marco Morbidelli[1], Virginia Amanda Volanti[1], Daniele Viciani[1,2], Renato Benesperi[1,2], Giacomo Santini[1,2], Alberto Masoni[1,2], Paride Balzani[1,3], Simona Maccherini[2,4], Emanuele Fanfarillo[2,4], Claudia Angiolini[2,4], Tiberio Fiaschi[4], Debora Barbato[2,5], Giuseppe Manganelli[2,5], Andrea Benocci[7], Giuseppe Mazza[2,6], Silvia Landi[2,6], Alessandra Lagomarsino[6], Camilla Fagorzi[1,2] and Alessio Mengoni[1,2]

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