

ReCROP – Improving soil macro- and meso-fauna diversity of Mediterranean agrosystems : Application to vineyards

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ReCROP – Context & Objectives

➔ Identify sustainable and resilient agricultural production systems in the Mediterranean region through the combined use of biotechnological tools and environmentally friendly agronomic practices.

Soil organisms play a key role in ecosystem processes, leading to essential soil functions and are used as bioindicators of soil quality. Their monitoring is crucial to assess the impact of beneficial agricultural practices on soil functioning.



Fig 1. Vineyards, Lugo, Spain

ReCROP investigates the effect of various practices (i.e mulching, bio-inoculation, crop rotation) on soils from different crops (maize, vine, aromatic and medicinal plants) in different countries (Morocco, Egypt, Tunisia, Italy, France, Portugal and Spain).

➔ Preliminary results of the study conducted in Spain are presented here

Experimental design

Study sites

Vineyards are located in the adjacent municipalities of Sober and A Teixeira (Lugo) both in Galicia (NW Spain). Straw mulching or Ulex europaeus mulching are compared with conventional management using herbicides. Agricultural soils were investigated during spring 2022.

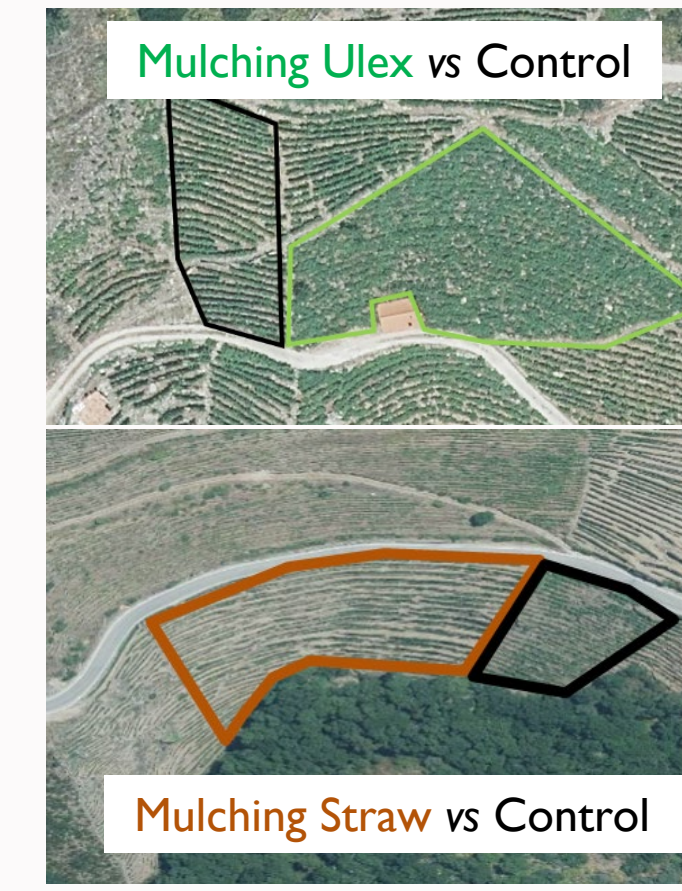


Fig 2. Aerial view of sampling sites

Epigeal mesofauna and macrofauna

Arthropods are sampled using pitfall traps containing a non attractive preservative (mono-propylene glycol). The traps are collected after 8 days.



Fig 3. Pitfall traps

Multitaxa approach



Ants



Spiders



Carabids



Springtails

➔ By studying abundance, species richness and diversity, as well as functional traits, it will be possible to produce a multi-taxa index of soil biological quality.

Preliminary results

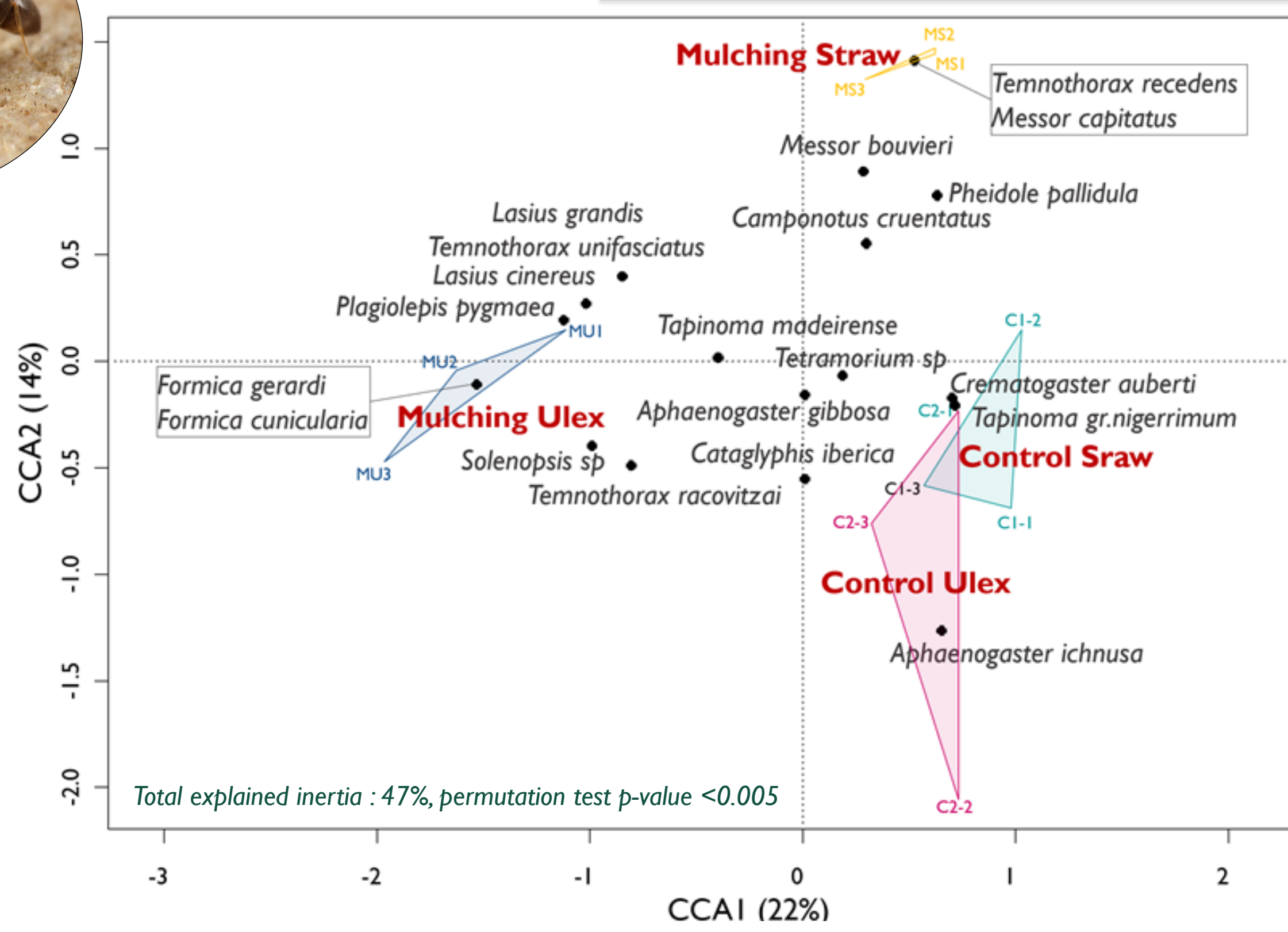


Fig 4. Projection of ants species data (occurrence) and practices on the first factorial plane of CCA analysis. Black points indicate position of species in factorial plane and practices are indicate in red.

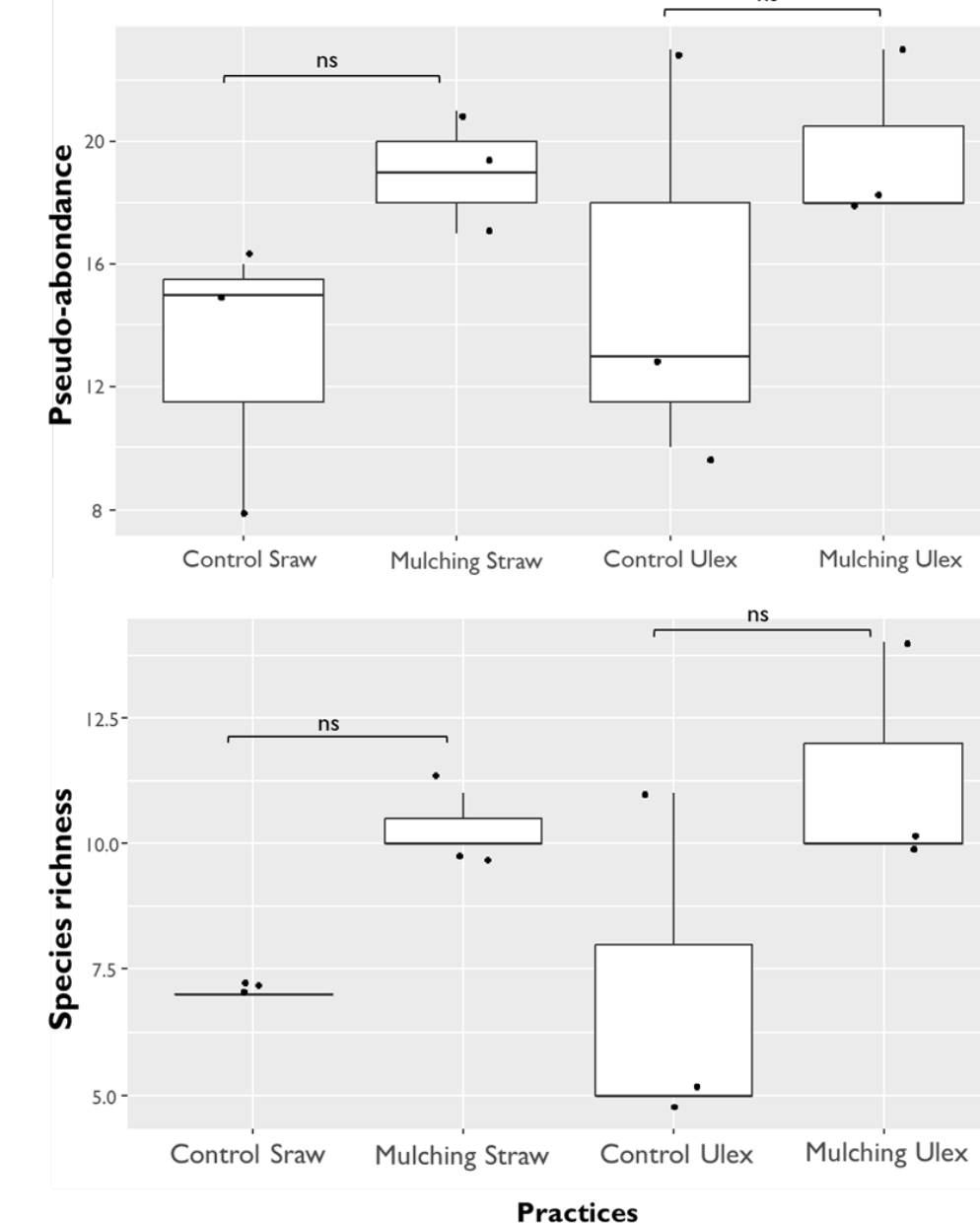


Fig 5. Pseudo-abundance and diversity of ants under the different treatments (Wilcoxon test, ns for non significant).

Ants

- ➔ No effect (despite a strong trend) of mulching on ant abundance and diversity but a **significant effect on community composition**
- ➔ **Mulching Ulex** was associated with **less thermophilic species** living in litter or shaded habitats such as *Temnothorax unifasciatus*, *Formica gerardi*
- ➔ May also reflect a greater presence of prey species such as *Collembola* in mulched plots
- ➔ **Mulching straw** was associated with granivorous species such as *Messor capitatus*, *Messor bouvieri*

➔ Mulch cover provide shade and moisture as well as additional food resources (i.e micro-arthropods from litter and seeds) (Arnan et al., 2007)

Spiders

- ➔ No effect on abundance and diversity of spiders
- ➔ A slight effect of mulching was observed on **community composition**
- ➔ Difference depending on body size and hunting strategies ?
- ➔ A trait based approach (body size, feeding trait, dispersal ability) may reveal an effect of practices on spider and ants communities (Blaise et al., 2021; Hedde et al., 2022; Plath et al., 2021)

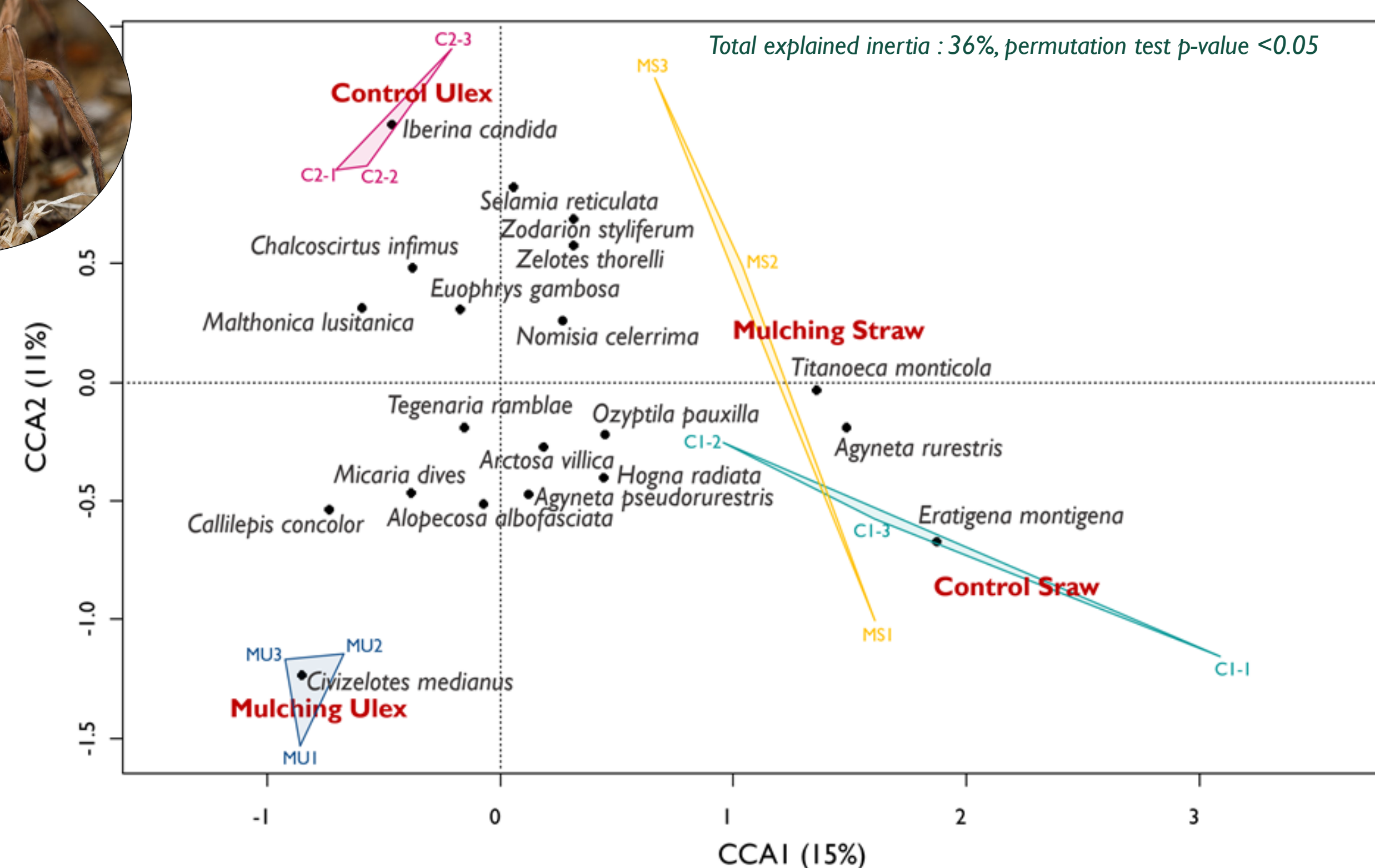


Fig 6. Projection of ants species data (abundance) and practices on the first factorial plane of CCA analysis. Black points indicate position of species in factorial plane and practices are indicate in red.

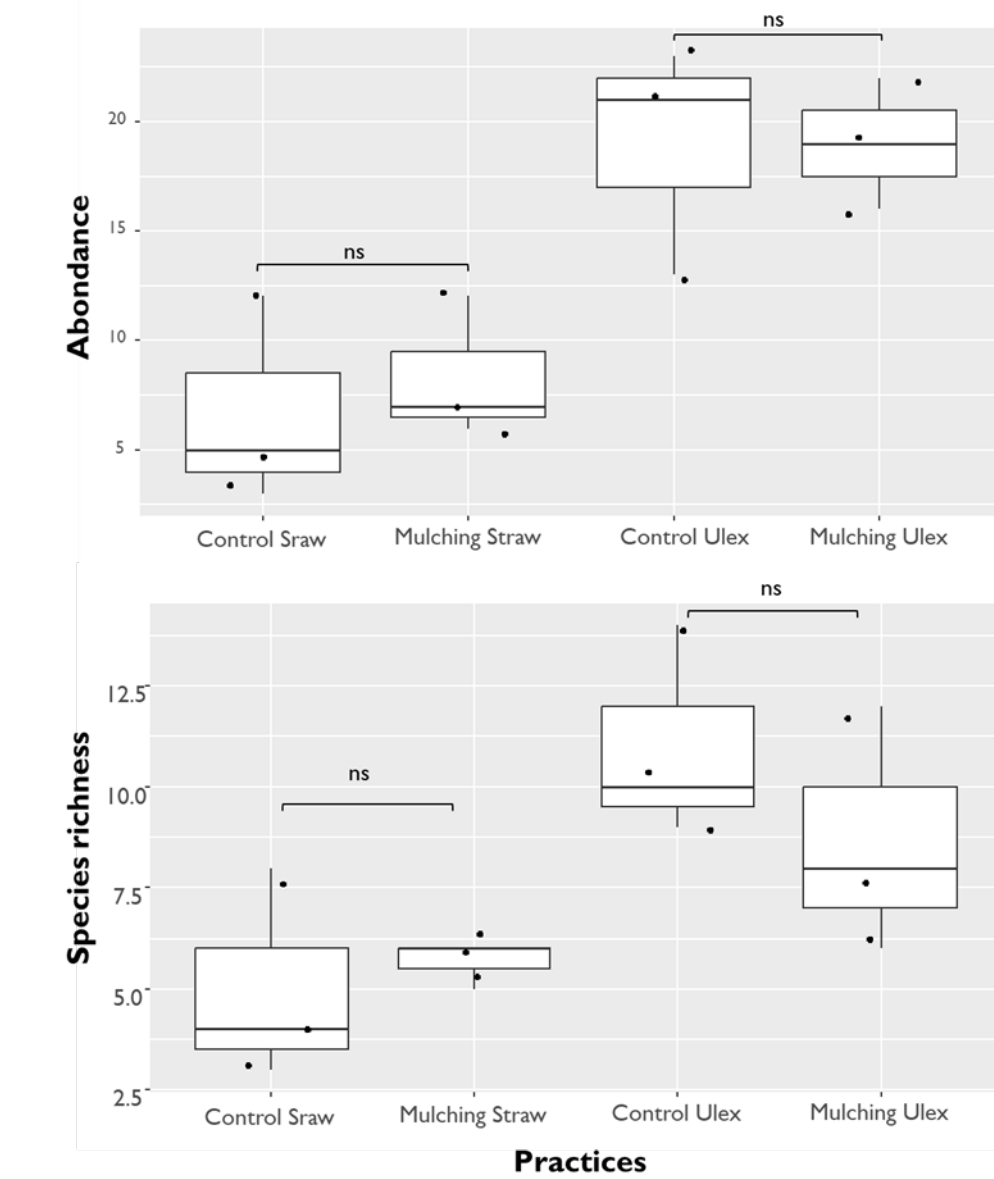


Fig 7. Abundance and diversity of spiders under the different treatments (Wilcoxon test, ns for non significant).

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