

Evaluation of some biological properties of soil after the incorporation of seven green manures

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Introduction

The accelerated and sometimes irreversible degradation of soils is one of the greatest risks for humanity. Blum (2000) defines this degradation as an unbalance of soil functions, which can cause physical, chemical, and biological damage, even in some cases its destruction. In Colombia, 93% of the agricultural soils are degraded by some level of erosion, 4.6% are under severe erosion, and only 7% are in good conditions (IDEAM, 2015). As an alternative practice to conserve soils properties without reducing their fertility, green manures have emerged as an agroecological technology which have proven to improve biological soil properties such as the diversity and abundance of soil invertebrates, keystone agents of soil functioning. This is of particular importance in agriculture lands owned by low-income farmers (Labrador, 2001). By reducing the use of traditional soil fertilizers and adopting agroecological management practices for agricultural systems can result in the colonization and/or proliferation of beneficial invertebrates for the soil (Mäder et al., 2002). The incorporation of green fertilizers is considered an agroecological practice that can improve the structure, diversity and composition of the of invertebrate community associated with the soil (Guzmán & Alonso, 2008).

Objective

Evaluate some biological properties of the soil under the incorporation of seven green manures including a forest species in an Andisol soil in southwestern Colombia.

Materials and methods

Location: This research was conducted at the farm “El Fondo”, 13 km far from Pasto city in the southwestern Colombian Andes, close to the border with Ecuador.

Experimental design: Seven species of plants were chosen as green fertilizers. The fertilization treatments were: **T0:** Absolute control (without fertilization); **T1:** Alverjilla (*Vicia sativa* L); **T2:** Llantén (*Plantago lanceolata* L); **T3:** Alfalfa (*Medicago sativa* L); **T4:** Clover (*Trifolium repens* L); **T5:** Turnip (*Brassica napus* L); **T6:** Chocho (*Lupinus mutabilis* Sweet) and **T7:** Alder (*Alnus jorullensis* Humboldt, Bonpland and Kunth).

Phase I. Establishment of plots: Sowing of green fertilizers.

Phase II. Incorporation of green fertilizers.

Phase III Sampling: TSBF methodology (Tropical Soil Biology and Fertility).

Phase IV. Identification of the individuals and statistical analysis.

Conclusion

In general, these results allow us to highlight the big effects of the Alder and Turnip in triggering the diversity of soil invertebrates and propose them as effective treatments to conserve soil functions in the region.

Results

Fig. 1. Comparison of mean abundances of soil invertebrates between each green fertilizer treatment and each soil depth at the experimental plot El Fondo.

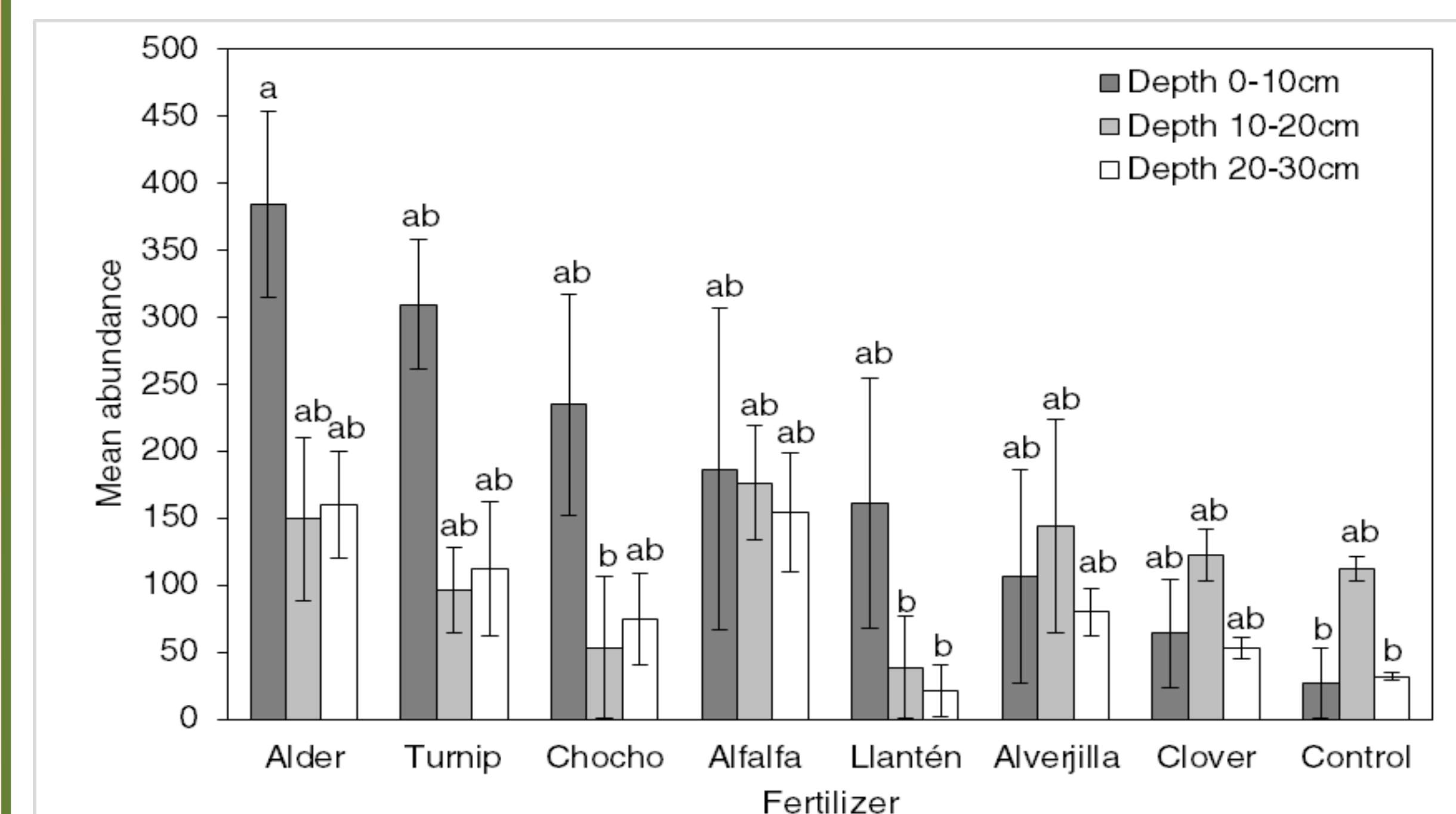


Fig. 2. Comparison of the mean family richness of soil invertebrates between each green fertilizer treatment and each soil depth at the experimental plot El Fondo.

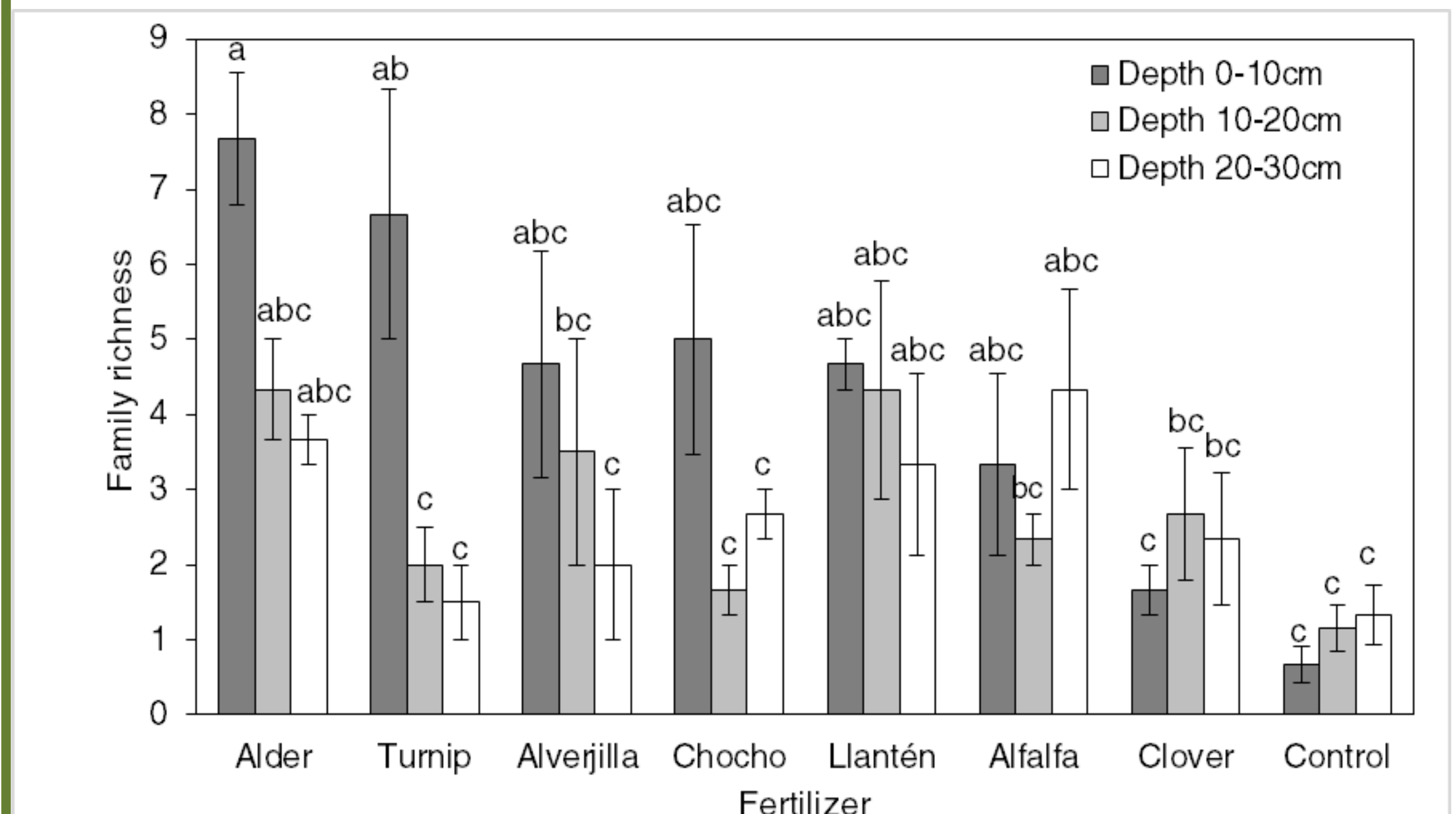
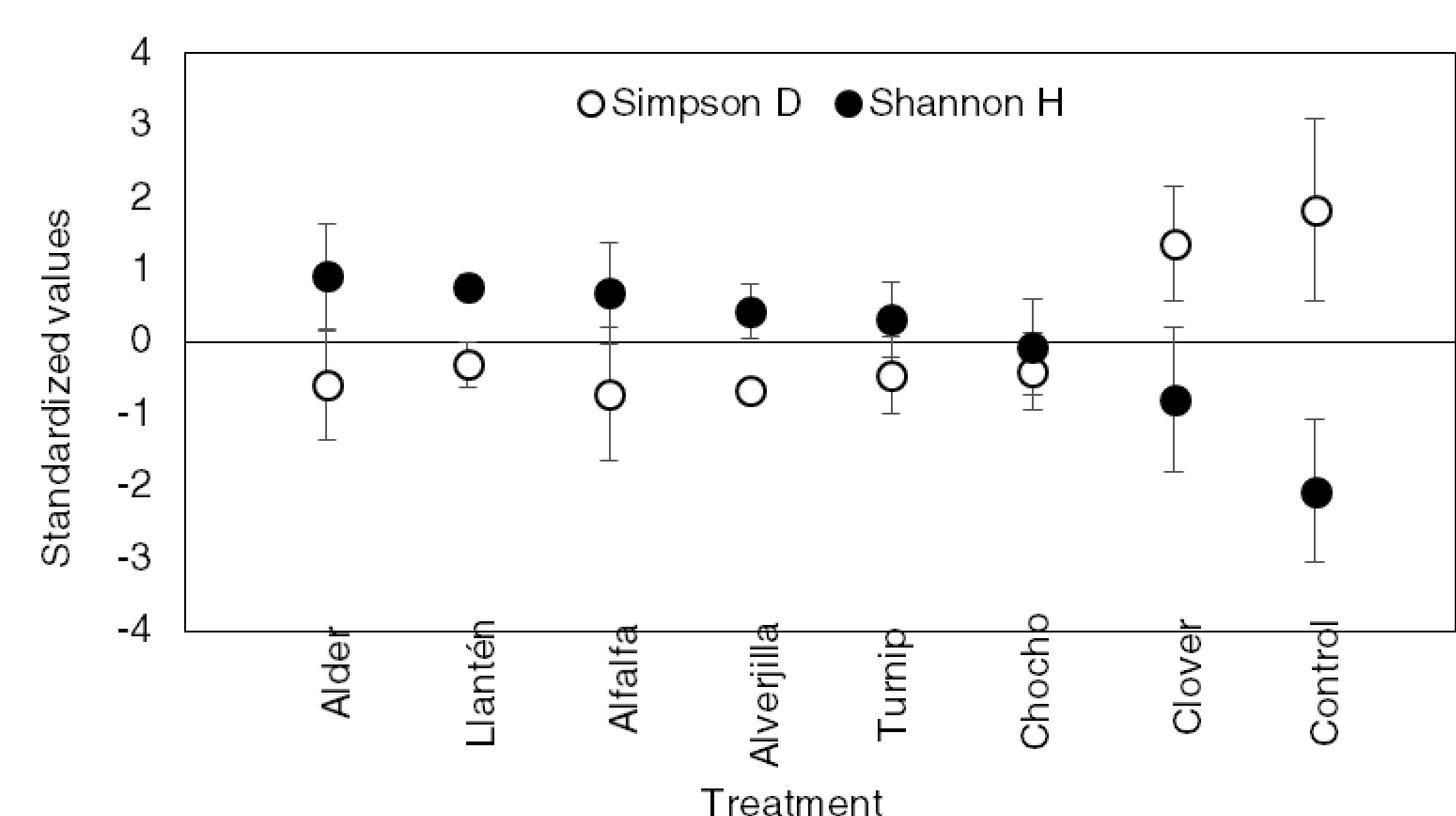


Fig. 3 Comparison of the mean values of diversity indices H' and S in each treatment and each depth in the experimental plot El Fondo.



References

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