

Soil organic carbon and dead biomass reservoirs in woodlands from the Monte region (Argentina)

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INTRODUCTION

The soil is the largest organic carbon reservoir in the terrestrial biosphere and is related to environmental controls such as vegetation. The soil and the above-ground dead biomass are important carbon compartments in drylands ecosystems. They depend on local controls and patterns that should be studied. The objective of this work is to study the role of the vegetation canopy of woodlands in the regulation of soil organic carbon and dead biomass in the septentrional and meridional areas of the Monte region in Argentina.

MATERIAL AND METHODS

Thirty sampling points were selected, identifying in each one three conditions: tree canopy (UT), intercanopy (IC) and shrub canopy (US) (Fig. 1). In each sampling point, soil, litter and dead wood were sampled. The Walkley and Black method was applied for soil organic carbon and the combustion method for litter and dead wood. Four physiognomic-functional groups were identified.

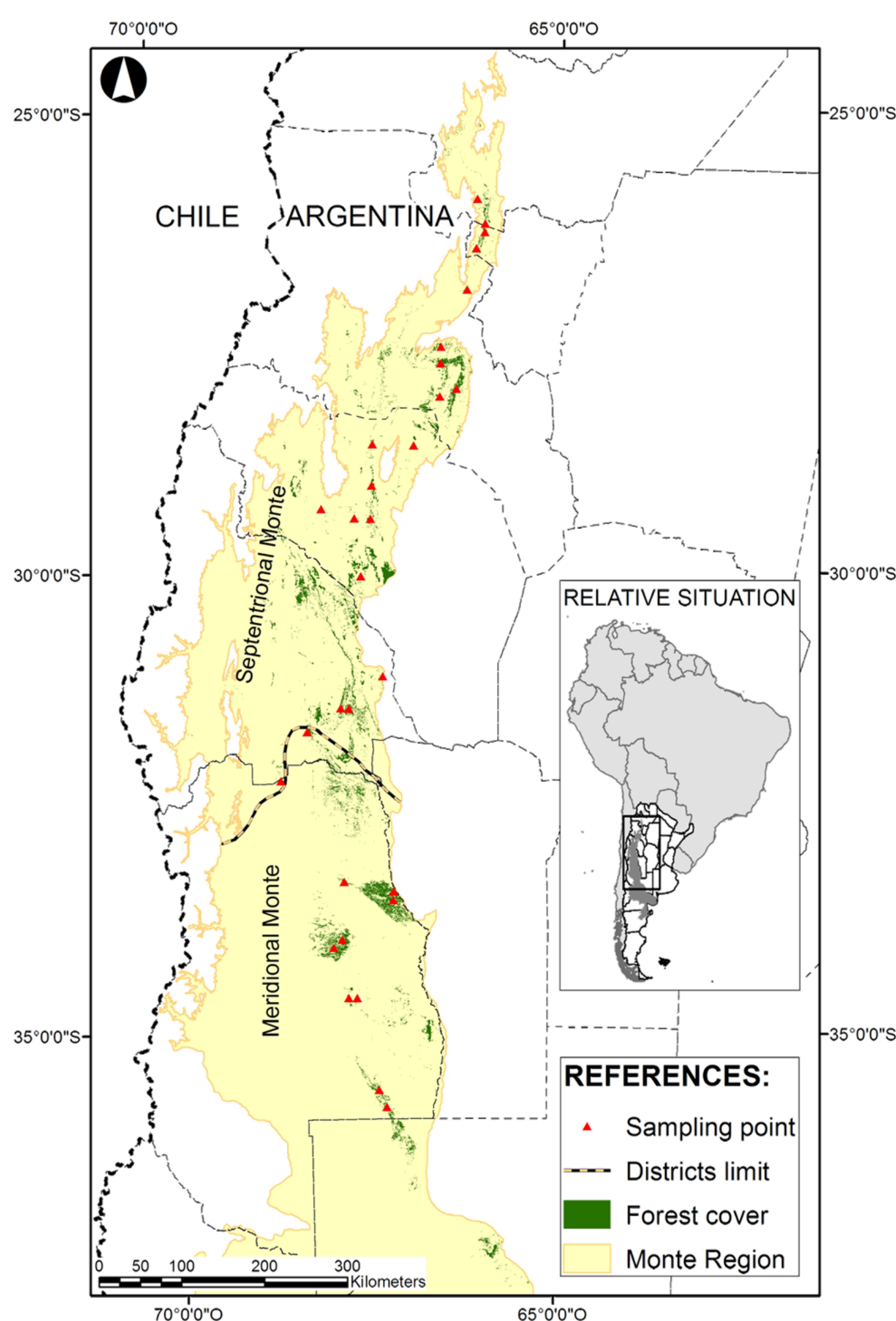


Fig. 1 (left): Sampling area in the Monte region.

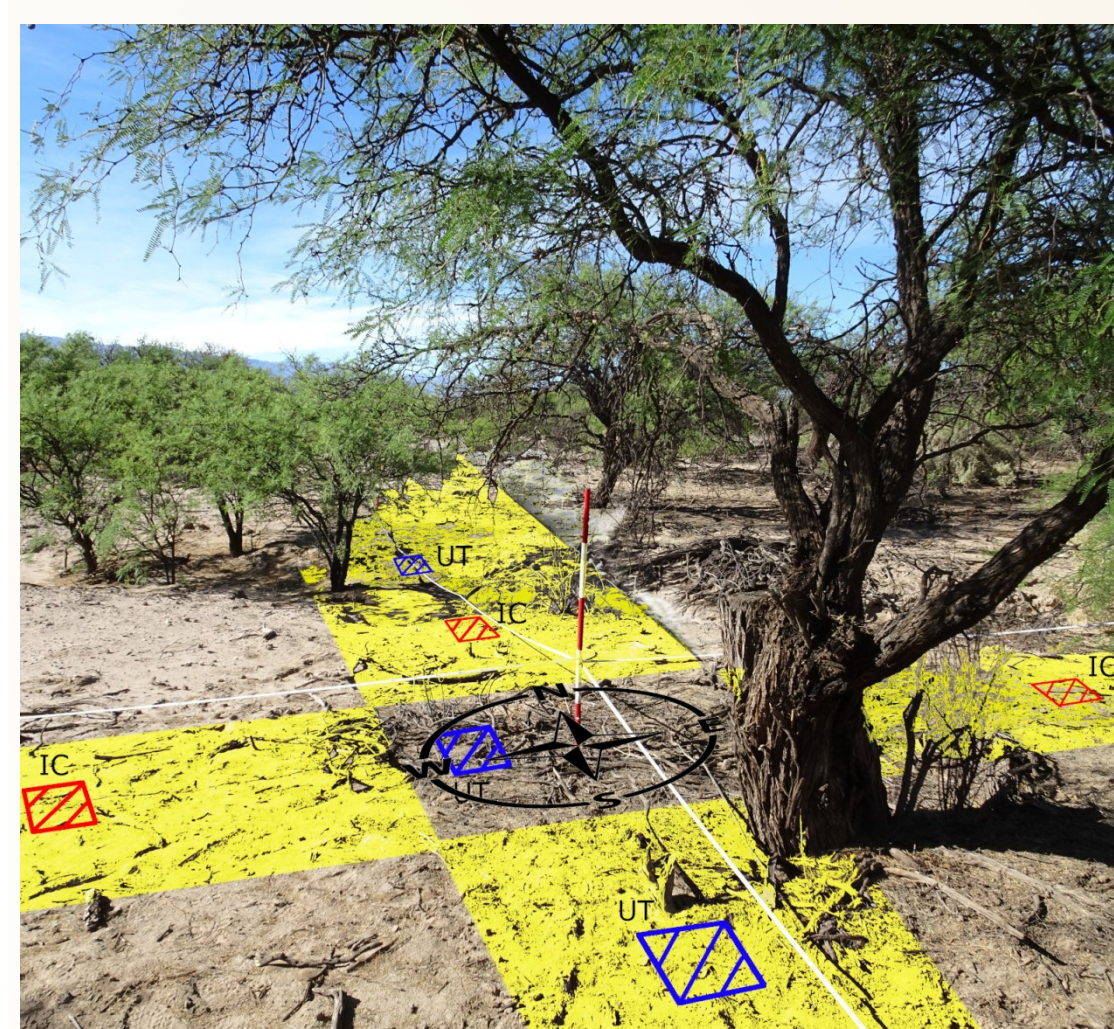


Fig. 2 (above): Sampling design. IC: intercanopy; UT: under tree canopy. In yellow, dead wood >5 cm diameter sampling strips.

RESULTS

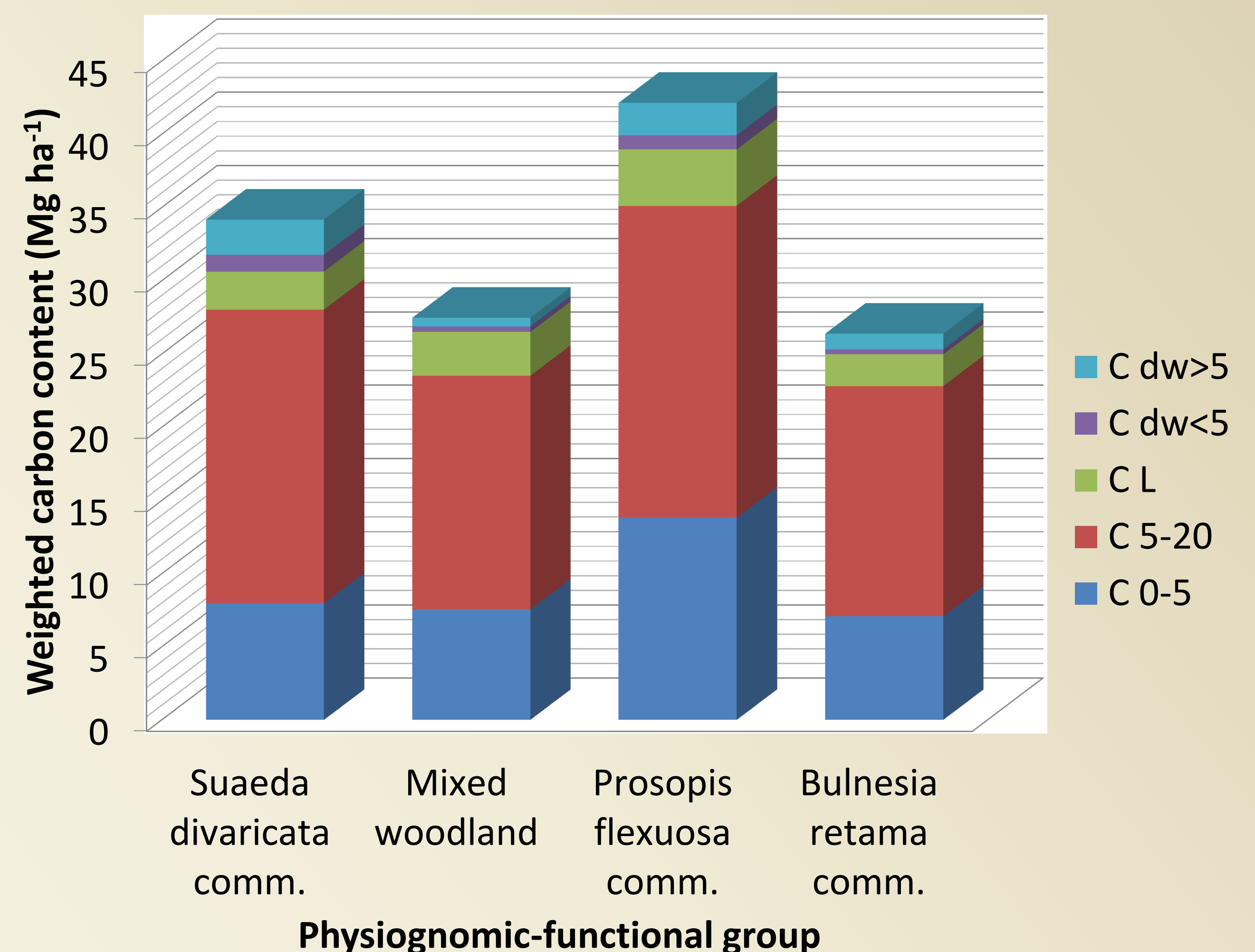


Fig. 2: Weighted carbon content per compartment in each group. Comm.: plant community. C 0-5 and 5-20: Soil organic carbon at 0-5 and 5-20 cm depth; C L: Litter carbon. C dw<5 and C dw>5: Dead wood carbon, less than 5 cm in diameter, over 5 cm in diameter.

DISCUSSION

Prosopis woodlands accumulate more than 38 Mg ha⁻¹ of dead organic carbon, followed by *Suaeda* woodlands with almost 35 Mg ha⁻¹. Mixed woodlands, representative from the Meridional Monte district, show average values around 27 Mg ha⁻¹, while *Bulnesia* woodlands are the poorest with around 25 Mg ha⁻¹. The vegetation canopy, and consequently the litter and dead wood input within fertile islands, affects soil organic carbon in the topsoil. The carbon inputs are intimately dependent on the plant functionality such as deciduousness or canopy volume. Therefore, shrubs such as *Larrea* spp. have a restricted ability to enrich the soil respect deciduous trees such as *Prosopis* spp. Soil, litter, and dead wood are important sinks of carbon respect the above-ground biomass in the Monte region.