



ORGANIC CARBON STOCKS AND TOTAL NITROGEN IN FOREST LITTER AND SOIL IN THE PEDUNCULATE OAK–COMMON HORNBEAM COMMUNITY (CARPINO BETULI–QUERCETUM ROBORIS /ANIĆ 1959 / RAUŠ 1971) OF DIFFERENT AGES



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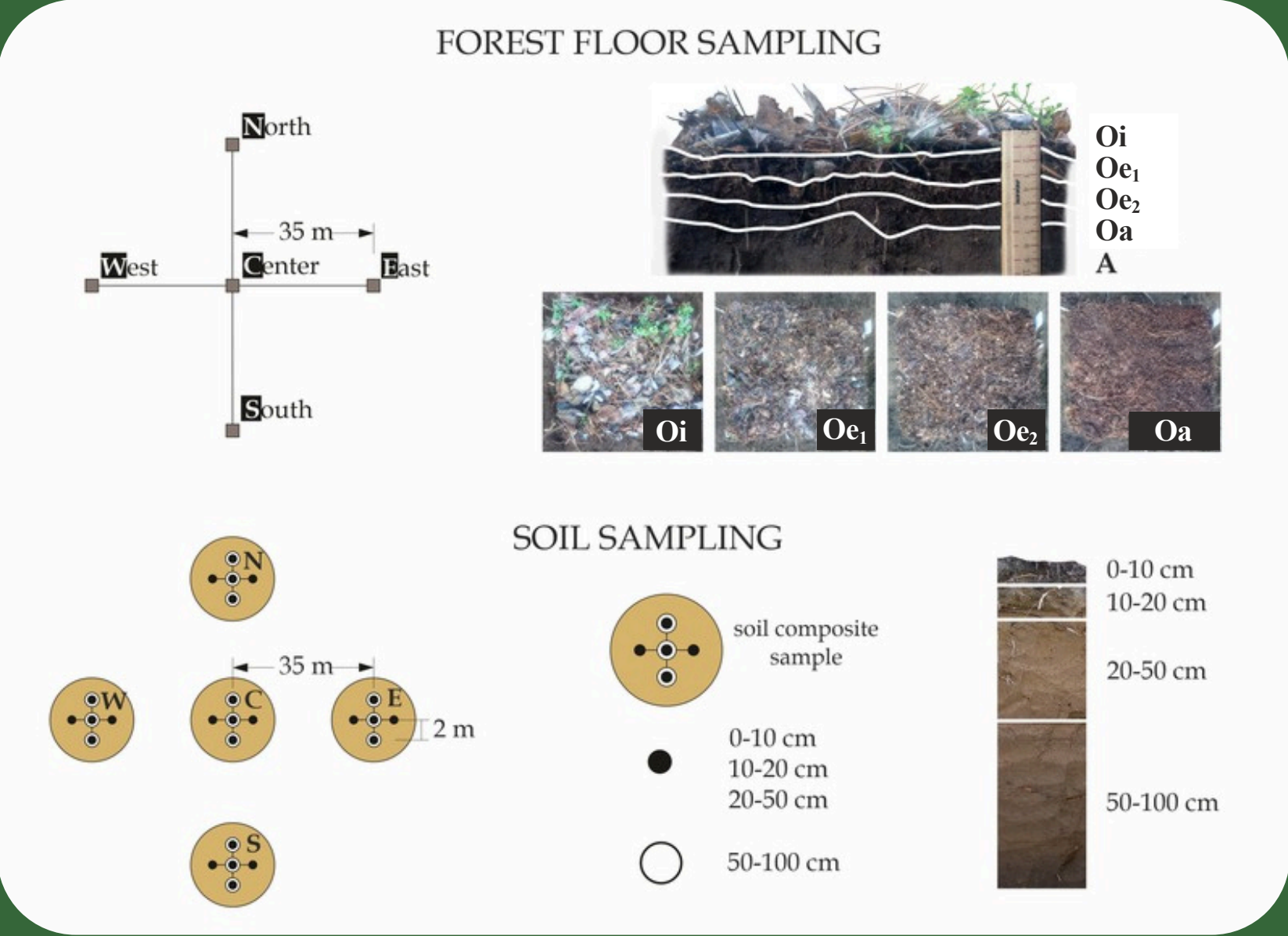
INTRODUCTION

By storing carbon in aboveground and belowground biomass, dead wood, the forest floor, and soil, forest ecosystems play a crucial role in mitigating climate change. This study presents the determined carbon stocks in the forest floor and soil to a depth of 1 m in stands of pedunculate oak and common hornbeam (Carpino betuli–Quercetum roboris / Anić 1959 / Rauš 1971) representing seven forest phases of development (F1 – F7), three different regeneration phases (RF1 – R3) and old forest (OF).

RESEARCH AREA



MATERIALS & METHODS



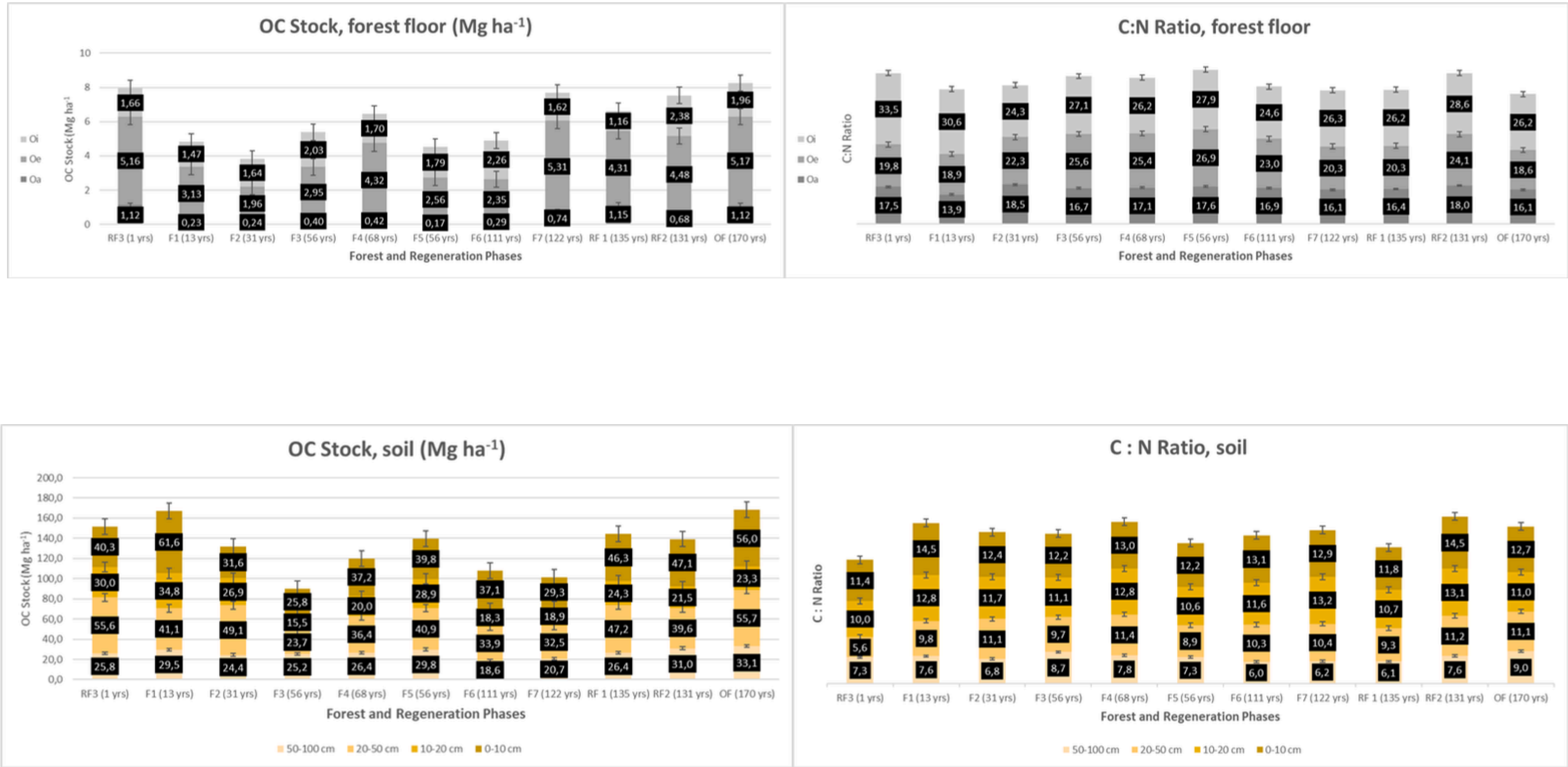
Soil sampling: at 11 locations (n = 5/locality), soil sampling at fixed depth layers (0-10 cm, 10-20 cm, 20-50 cm and 50-100 cm) and forest floor layers (Oi, Oe and Oa): 220 disturbed + 220 undisturbed (Kopecky, 100 cm³) samples and 165 forest floor samples.

Laboratory analysis: pH-values (ISO 10390); mineral carbonate (ISO 10693); total carbon content (ISO 10964 1995); total nitrogen content (ISO 13878 1998); bulk density (ISO 11272, 1998)

OC stock calculation:

- soil:** OC stock (Mg C ha⁻¹) = OC (%) × bulk density × layer thickness × (1 – coarse fragment fraction, (De Vos et al. 2015); no coarse fragments observed.
- forest floor :** OC stock (Mg C ha⁻¹) = OC (%) × m (Mg) × A (ha)

RESULTS



The organic carbon (OC) stock in the mineral soil ranges from 90.02 Mg C ha⁻¹ in F3 to 168.08 Mg C ha⁻¹ in OF, with an average of 132.84 Mg C ha⁻¹. This value is lower than the OC stock reported for the old-growth Pedunculate Oak forest “Prašnik” (215.26 Mg C ha⁻¹) by Bakšić et al. (2018). The average carbon stock in the forest floor determined in this study (6.18 Mg C ha⁻¹) is similar to that reported for pedunculate oak forests under close-to-nature forest management (6 Mg C ha⁻¹) by Ostrogović Sever et al. (2019), but lower than the value reported for the old-growth Pedunculate Oak forest “Prašnik” (8.88 Mg C ha⁻¹) by Bakšić et al. (2018). The C/N ratio has been identified by Akselsson et al. (2005) as a useful indicator for assessing carbon sequestration in soils. In this study, the C/N ratio remained relatively stable across soil depths, suggesting balanced carbon and nitrogen cycling throughout the soil profile.

CONCLUSION

This research identified a similar trend in OC stocks in the forest floor and soil, with the highest values observed in regeneration phases and old-growth stands. Under close-to-nature forest management, pedunculate oak forests have been shown to sustainably provide both economic and ecological ecosystem services. These results confirm the important role of close-to-nature forests as a carbon storage reservoir in the forest floor and soil, and thus as a tool to fight against global warming.

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