

# Carbon sequestration and social cost assessments in a Mediterranean agrosilvopastoral system using the InVEST model

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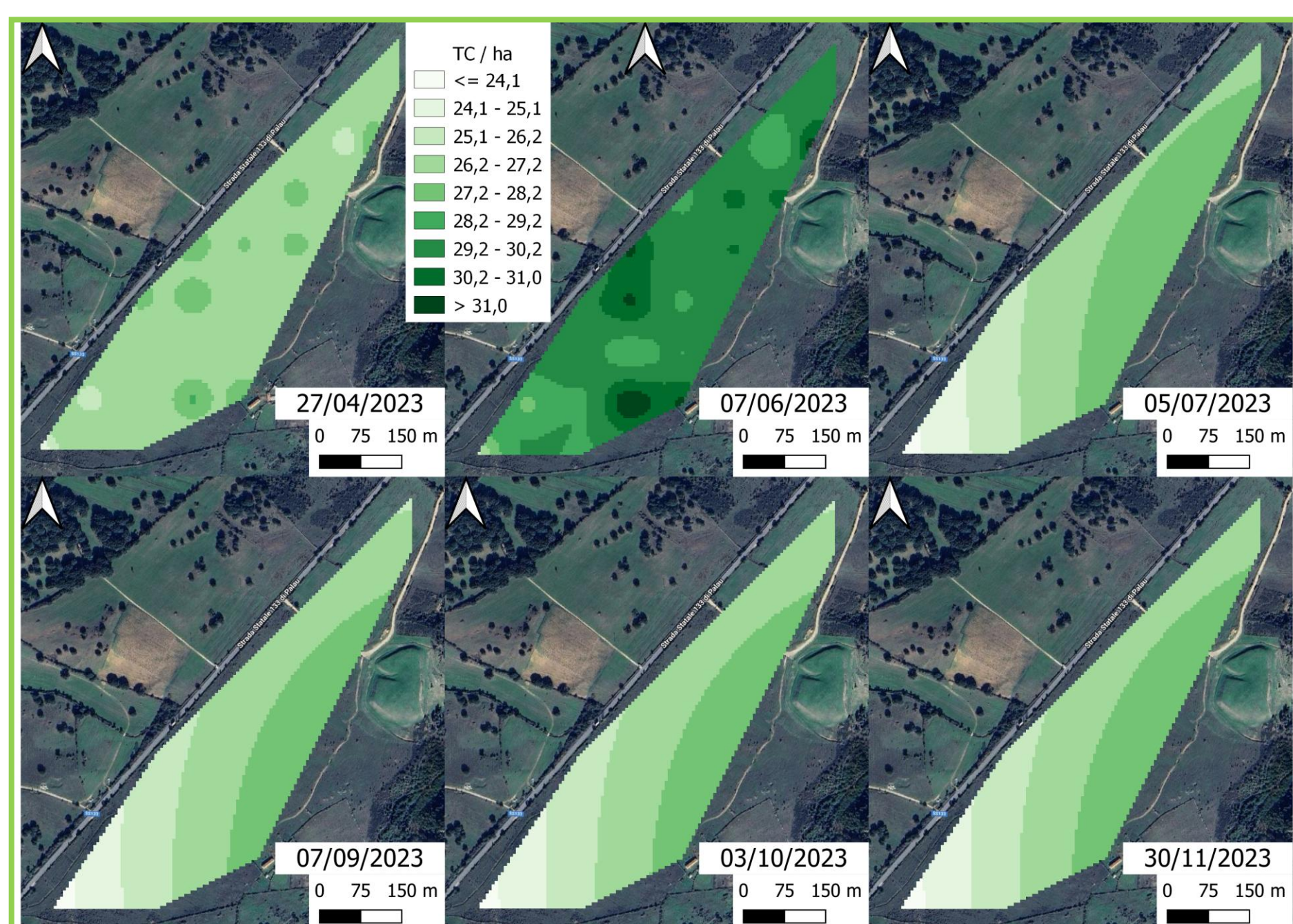
## Introduction

Carbon farming is an effective strategy to improve food production that contributes to the regulation of climate, providing vital ecosystem services. Permanent pastures represent one of most widespread land uses and can exert a significant influence on the global potential for soil carbon storage. Quantifying and mapping soil carbon stock (SOC) of these systems is often used as an indicator of agroecosystems' carbon sinks and sources.



## Objective and methods

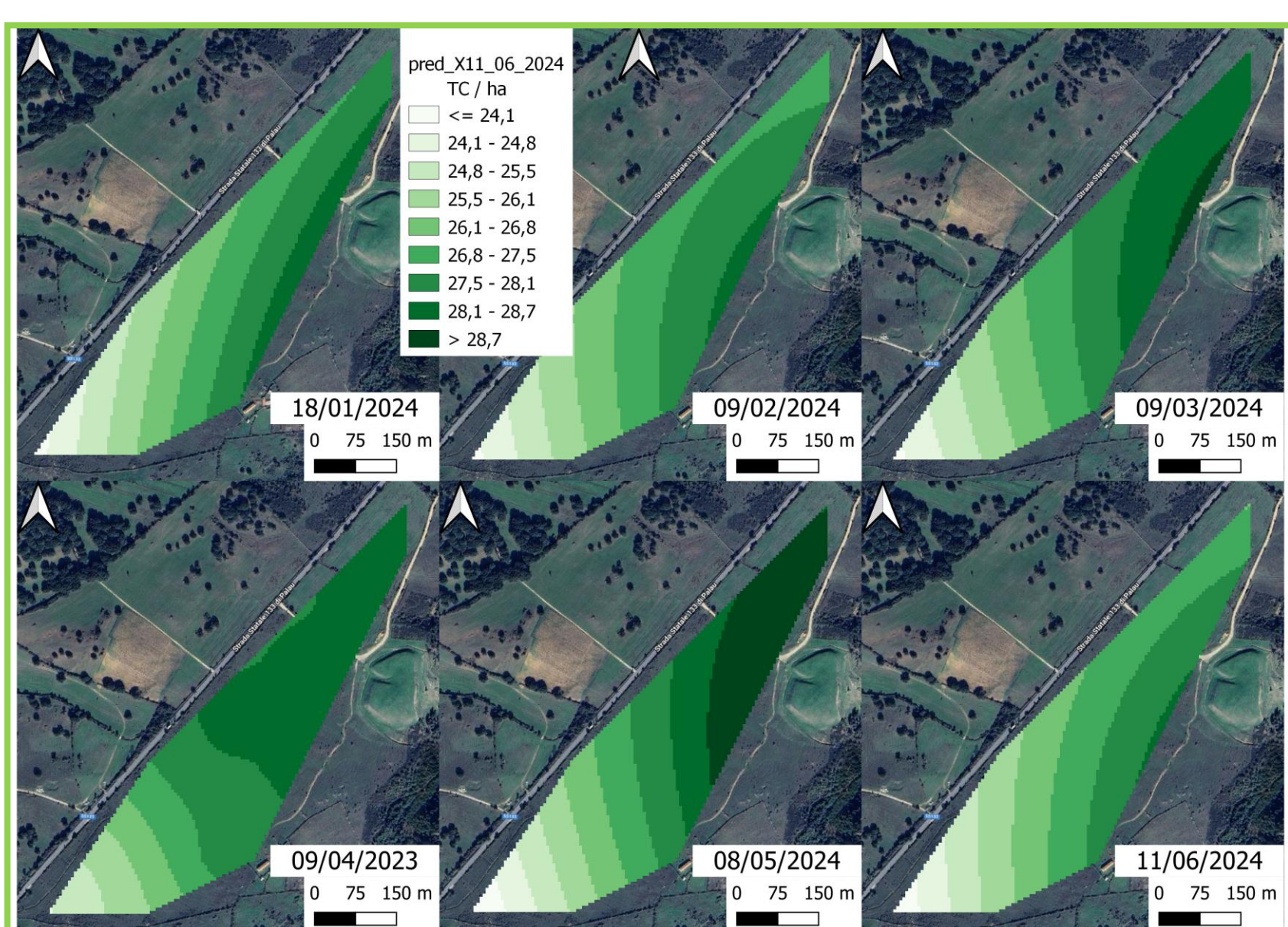
The objective of the research was to quantify, map, and assess carbon storage in agro-silvo-pastoral Mediterranean agroecosystems to support the development of land-use management strategies for improved landscape-scale carbon sequestration. The analysis was conducted during two growing seasons of the years 2023-2024 and integrated the carbon soil data analysis, plant and root biomass in the InVEST Carbon Storage and Sequestration (InVEST) model for simulating the agroecosystem carbon storage.



## Results

The results showed that the SOC was 124.03 and 157.08 T C ha<sup>-1</sup> yr<sup>-1</sup> in 2023 and 2024 seasons, respectively. The improvement of SOC in the second growing season was due to a combination of no-tillage practices and higher green biomass pasture influenced by the different thermo-pluviometric conditions of the two years.

According to the cost-benefit analysis conducted with the Greenhouse Gas Impact Value Estimator (GIVE), the potential gross SOC sequestration would lead to an estimated economic benefit for the society of \$22.940,00 and \$29.193,00 for hectare in the 2023 and 2024 seasons, respectively



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National Plan for Resilience and Resistance (NRP) - Mission 4 Component 2 Investment 1.4 - Notice No. 3138 of December 16, 2021 corrected by D.D. No. 3175 of December 18, 2021 of the Ministry of University and Research. Project Code CN\_000033 MUR Directorial Decree No. 1034 of June 17, 2022 grant of funding, CUP J83C22000870007, project title "National Biodiversity Future Center (NBFC)".

## Conclusions

the results show that the potential of SOC sequestration of no-tilled Mediterranean pasture allows to increase soil fertility beneficial to the sustainability of agricultural production. In addition, these findings could be used as a practical tool for policymakers and land managers to evaluate the potential of SOC sequestration at landscape level and promote "win-win" solutions to meet the targets of the Paris Agreement.