

SOIL ORGANIC CARBON (SOC) STOCK IN ORANGE GROVES AND NATIVE VEGETATION OF FIVE CITRUS FARMS

Soil organic carbon (SOC) maps are an important tool for estimating carbon stocks in different land uses.

Introduction

As a perennial crop, orange groves older than 15 years have a great potential to increase SOC, depending on the crop management. The citrus belt of São Paulo and Triângulo Mineiro/Southwest Minas Gerais is an important orange producing region, with more than 560 thousand hectares between orange groves and areas designated for nature conservation. The objective was to determine the SOC stocks in orange groves more than fifteen years old and in adjacent areas covered by native vegetation.

Methods

The study was carried out on five orange farms representative of the citrus belt, one of which has a grove managed according to organic certification standards. The SOC stock per hectare was determined using raster SOC maps from Embrapa (Vasques et al., 2021) (90x90m) and MapBiomias (2023) (30x30m) and in-situ evaluation of the 0-30 cm soil layer (0-10, 10-20, and 20-30 cm depths). ArcGIS and QGIS were used for the Geographic Information System (GIS) procedures and analysis. Soil C content and bulk density were analyzed for in situ SOC stock assessment. For bulk density (g dm⁻³), undeformed samples were collected. For soil C content determination, composite samples were analyzed using the dry combustion method in a C elemental analyzer.

Results and discussion

The evaluated data of SOC stock in the 0-30 cm soil layer confirm that the native vegetation areas have a higher mean SOC stock (40.1 Mg C ha⁻¹) than the citrus grove areas (32.27 Mg C ha⁻¹). The mean of the estimated SOC stock per hectare (40.59 Mg C ha⁻¹ for Embrapa map and 40.6 for MapBiomias map) of the native vegetation area was very close to the evaluated SOC stock (40.1 Mg C ha⁻¹) in the same land cover. However, the mean of the estimated SOC stock per hectare (39.4 Mg C ha⁻¹ for Embrapa map and 41.4 for MapBiomias map) of the citrus grove area was much higher than the evaluated SOC stock (32.27 Mg C ha⁻¹) in the same land cover.

Conclusions

The two SOC maps (Vasques et al., 2021; MapBiomias, 2023) overestimated the SOC in four orange groves and underestimated the SOC for the farm with organic grove management. The results presented show that the estimation of SOC stocks through maps must be done with caution, especially in areas with land use changes that may reduce or increase SOC stocks.

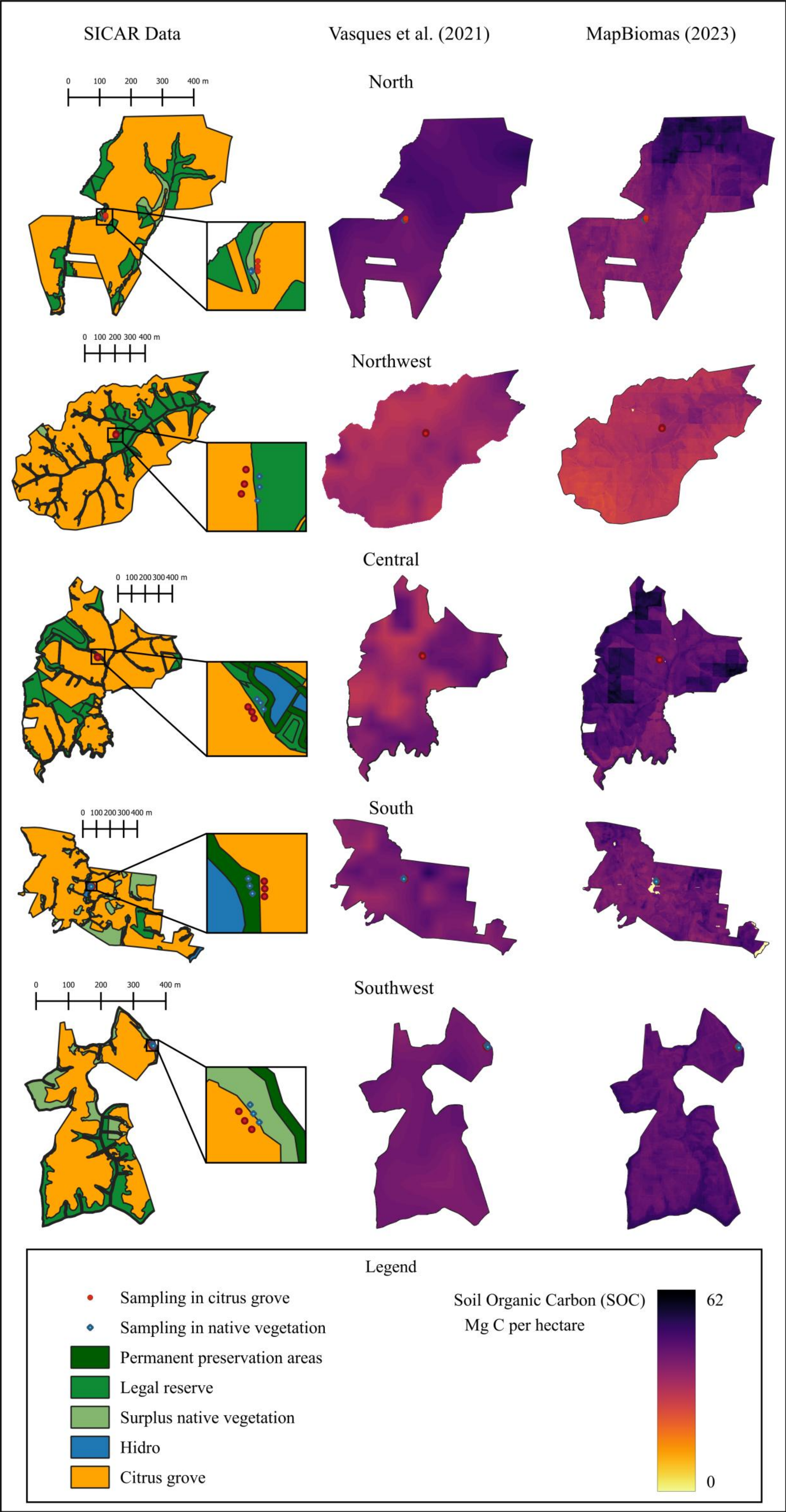


Figure 1

Soil organic carbon (SOC) sampling points and maps (SICAR data and Brazilian SOC maps) for citrus grove and environmental conservation areas (native vegetation) in citrus farms across the Brazilian Citrus Belt.

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ACKNOWLEDGEMENTS

We thank to Innocent Drinks CO for financial support through the Farmer Innovation Fund and for their valuable input on this study. We are also grateful to the owners and employees of the citrus farms involved and to the FlorAgro team members who assisted in fieldwork and soil sample preparation. Without their contribution of financial, human, and material resources, conduct this important study for the citrus belt of São Paulo and West/Southwest Minas Gerais would not have been possible.

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