

What key factors affect soil biodiversity in the olive groves of Alentejo (Portugal)?

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Abstract

Rural landscapes in Alentejo (S Portugal) have changed greatly along the past 15 years, largely due to the expansion and intensification of olive groves, and lately also of almond groves. This process of intensification (i.e., increase in olive tree density), if managed inadequately, may compromise the quality, biodiversity, habitat and performance of soils. It is, therefore, essential to foster and enact the sustainable intensification of agricultural production to avoid jeopardizing crop production and soil use in the future. Monitoring ecological functions and soil biodiversity will allow to determine how the sustainability of olive groves is impacted by different agricultural management options and decisions.

In this work, we hypothesize that different management practices, such as herbaceous cover crops, tillage or use of herbicides, can significantly affect soil biodiversity in olive groves. We tested this hypothesis in six distinct olive groves and four adjacent “montados” across Alentejo. The soil microbial, mesofauna and insect diversity was assessed for different: i) olive management practices, ii) land use mosaics (montado, intensive and superintensive olive groves) and iii) olive grove microsites (tree row vs interrow). Three composite soil samples were collected from each site and processed for amplicon sequencing targeting the 16S rRNA gene for bacteria and the Internal transcribed spacer (ITS) for fungi. Soil mesofauna diversity was assessed using the Berlese-Tullgren method in three soil samples from each test site, and insects’ diversity was assessed within three pitfall traps in each test site. Preliminary results confirm that implementing cover crops instead of tillage or herbicides can significantly increase microbial abundance, soil mesofauna (mites) and insect diversity (ants and coleoptera) in olive groves regardless their land uses. The results of this work will contribute to defining which management practices best preserve biodiversity and soil functionality, thus ensuring the sustainability of olive groves.

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