

Agriculture intensification decreases soil C content and respiration activity in a Mediterranean Vertisol

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Adoption of intensive and non-conservative farming practices in Mediterranean areas, often causes a strong reduction of soil organic C, with major side effects on soil functioning and CO₂ emissions to atmosphere. The purpose of our research was to evaluate the effect of durum wheat (*Triticum durum* Desf.) (DW) based rotations, common in Southern Italy, on soil organic C content and soil potential respiration, after 19 years of cultivation. The rotation experiment was carried out since 1992 in Foggia (Apulia, Italy) at the experimental farm of the Cereal Research Centre in a clayey vertisol. Here we report results concerning two rotations, among seven: continuous durum wheat (CDW) and bare fallow-durum wheat-durum wheat- (BF-DW-DW) compared with an adjoining soil, covered with permanent grassland undisturbed, since 1972, considered at steady state. Results showed a negative trend of soil C in both rotations. The C reduction respect to the undisturbed soil (14.5 g C kg⁻¹ of soil) were 0.15 and 0.13% for CDW and BF-DW-DW, respectively. Daily soil potential respiration was always higher in the undisturbed soil: it was 13.65, 10.46 and 8.64 mg C-CO₂/kg soil day⁻¹, for undisturbed soil, BF-DW-DW and DWC respectively. The cumulative respiration in 28 days for CDW and BF-DW-DW rotations compared with undisturbed soil was lower by 23 and 32%, respectively. Among the two rotations compared, BF-DW-DW showed to be slightly more conservative than the DWC rotation for soil C, even though none of the two rotations was able to keep the soil C level at values comparable to steady state, due both to soil disturbance and to lower C inputs respect to the permanent cover.