

EGU22-2961

<https://doi.org/10.5194/egusphere-egu22-2961>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Biophysical Measurements and Soil Loss Rate Assessment in Field Studies with Improved Cropping Techniques

Ioannis Tsanis¹, Sofia Sarchani¹, Ioanna Panagea², and Aristeidis Koutroulis¹

¹Technical University of Crete, School of Chemical and Environmental Engineering, Chania, Greece (tsanis@hydromech.gr)

²Department of Earth and Environmental Sciences, KU Leuven, Celestijnenlaan 200 E, Box 2411, 3001 Leuven, Belgium

Conventional cropping practices in soils that are under imminent threat of desertification, as those on Crete, often lead to soil erosion. An experiment under the framework of the SoilCare H2020 EU project was set up in three field sites in Western Crete, Greece, to evaluate the impacts of diverse cultivation techniques on soil loss. The targeted crops were olive orchards, vineyards and fruit orchards, in which a control versus treatment (soil-improving cropping system, SICS) experimental design was applied. Different tillage practices were compared in olive orchards (normally tilled to no-tilled), vetch cover crop to no vetch application was tested in a vineyard, whereas the conversion of an orange grove to an avocado farm was implemented. Soil loss (erosion/deposition) rate and soil properties as well were monitored between 2018 and 2021 in the field studies, comparing the results from control areas and SICS areas. The soil loss rate monitoring occurred with measurements through cross sections on the olive orchards and vineyards, or soil pins on the fruit orchards. The biophysical measurements concerned soil texture, saturated hydraulic conductivity, water stable aggregates, bulk density, mineral nitrogen, available phosphorous, exchangeable potassium, sodium and magnesium, soil organic carbon, soil pH, soil electrical conductivity, and earthworm count. The results [1] indicate that for the olive orchards, no-tillage practice reduced average erosion/deposition by 14%. The application of vetch treatment reduced mean soil loss by 13% and for the fruit orchards, the rotation of orange trees to avocado trees reduced mean soil erosion/deposition by over 34%. The biological health and condition of the SICS plots of the olive orchards and vineyards were improved compared to the control ones. Water and solute movement as well as soil aeration were appropriate for no-tillage and avocado trees treatments, and slightly improved in the case of vetch cover application. The experimental results demonstrate the critical footprint of improved cropping techniques to soil loss mitigation and sustainable land management.

[1] Tsanis, I.K., Seiradakis, K.D., Sarchani, S., Panagea, I.S., Alexakis, D.D., Koutroulis, A.G.: The Impact of Soil-Improving Cropping Practices on Erosion Rates: A Stakeholder-Oriented Field Experiment Assessment, *Land* 2021, 10(9): 964. <https://doi.org/10.3390/land10090964>