Geophysical Research Abstracts
Vol. 16, EGU2014-12712, 2014
EGU General Assembly 2014

Land use change from forest to olive grove soils in a toposequence in Mediterranean areas (South of Spain)

Maria Luisa Fernandez, Luis Parras-Alcántara, and Beatriz Lozano-García

Department of Agricultural Chemistry and Soil Science, Faculty of Science, Agrifood Campus of International Excellence - ceiA3, University of Cordoba, 14071 Cordoba, Spain

Olive grove (OG) is the most important crop in Andalusia (South of Spain), the main production area in the world. Throughout its development over the years, land use change (LUC) has been one of the most common phenomena, causing soil erosion and the loss of soil quality. This effect is aggravated by the climatic conditions and poor soil management practices.
This study examined the effect of LUC from natural forest to OG in a toposequence (summit, backslope, toeslope) of a calcisols-regosols-vertisols sequence in Torredecampo (South of Spain). The studied parameters were soil organic carbon (SOC) and nitrogen content; C and N stock; and stratification ratio (SR).
Total SOC (T-SOC) was low for both forest and OG soils, with a pattern of decrease from the highest (summit) to the lowest topographical position (toeslope) in forest soils, but not for OG soils, where the highest T-SOC was found in the lowest topographical position. T-SOC was more than 40% higher in forest soils than in OG soils in the summit and backslope, but not in the toeslope. This can be explained by the difference in tree and vegetative coverage from both soil uses. Natural vegetation prevents that erosion diminishes soil quality and carbon content, as well as excessive erosion from higher to lower topographical positions.
SOC stock in forest soils remained evenly distributed in the three topographical positions. However, the trend for the studied olive OG soils was to have the highest SOC stock in the toeslope and the lowest in the summit. Erosion and subsequent sediment deposition in the toeslope could also be the reason behind this difference between forest and OG soils.
TN followed a pattern of decrease with depth in the OG soils, but not in the forest soils. This could be because of increased erosion and fertiliser leaching caused by the lack of vegetative cover.
As for TN stock, it was higher in forest soils than in OG soils, with an exception (toeslope). In this case, the exception can also be attributed to erosion as it was the case for SOC stock, suggesting a general soil quality loss due to LUC, affecting several properties.
SR was also calculated as an indicator of soil quality. If this indicator is higher than 4 for forest soils and higher than 2 for agricultural soils, they are considered of high quality. SR values in forest soils had a general trend of increasing from higher to lower topographical positions, despite the fact that T-SOC decreased from higher to lower topographical positions. This could indicate that soil quality is higher in lower topographical positions even though there is less T-SOC, because soils are more stable.
SR values in OG soils had a similar trend than in forest soils (but with lower values): an increase from higher to lower topographical positions. However, T-SOC increased as well in the same way, which was opposite to the forest soils case.
Therefore, soil quality was higher in lower topographical positions for both land uses.