



Impact of agriculture management practices on soil quality on maize and vineyards in Portugal

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In the last century, agricultural management practices have been widely assessed based on cost production and crop yield. Land use intensification and increasing use of inputs such as fertilizers and pesticides, have raised concerns about the impacts on soil properties and functions. Physical, chemical and biological properties determine soil quality and directly influenced by the agricultural management practices. Vineyards and maize are two relevant crops in Portugal, which have been intensively managed. But some farmers are concerned with agriculture sustainability and improving their management practices. This study aims to assess impact of potential best management practices on soil quality, under iSQAPER research project. Two different agriculture practices were investigated: (1) the use of sewage sludge from domestic wastewater treatment plant in a maize field, and (2) water diversion and drainage practices in vineyards. This study was carried out in the central region of Portugal. Two maize fields were selected in Baixo Mondego: one receiving sludge (2.2 ha) and another managed with conventional practices, based on mineral fertilization (32 ha). Two vineyards were selected in Anadia: one with water diversion and drainage practices (0.5) and a conventional vineyard (3 ha) without any drainage system, located next to each other. The study sites have been intensively used for more than 4 years under those agricultural management practices. The four study sites were monitored in 2018, through the assessment of physical (texture and bulk density), chemical (pH, organic matter content, labile carbon, Kjeldhal nitrogen, total phosphorus, plant available phosphorus and potassium and heavy metals - Cd, Cr, Pb, Zn and Ni) and biological (biodiversity of earthworms) soil quality indicators were assessed. Results show that in maize fields, the application of sewage sludge improve the organic matter content, total nitrogen and phosphorous, as well as plant available phosphorus and potassium. Although the use of sludge favor soil microorganisms, as demonstrated by high earthworm biodiversity, there is a long term risk for soil contamination. Higher contents of heavy metals, specifically Zn, Cd and Cr, were found in the field with sludge than in the conventional one. In vineyards, the farm under water diversion and drainage practices shows higher organic matter content and plant available potassium than the conventional farm. Overall, the two best management practices investigated improve soil quality when comparing with conventional practices. The assessment of the impact of management practices on soil quality is of utmost importance to support farmers to achieve more sustainable production.