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Pruning residues incorporation and reduced tillage improve soil organic matter stabilization and structure of salt-affected soils in Citrus tree orchard under semi-arid climate conditions

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Arid and semiarid regions represent about 47% of the total land area of the world and around 40% of the world's food is produced there. In these areas, soil salinization is an emerging problem due to unsustainable land management practices and climate change. However, the use of sustainable land management practices in salt-affected soils can offset the negative effects of salinization and increase soil carbon stocks. In a Citrus tree orchard under semi-arid climate conditions, we evaluated the effect of (i) intensive tillage along with flood irrigation (IT); (ii) combination of no-tillage with pruning residues (branches and leaves) as mulch, and drip-irrigation (NT+PM); and (iii) combination of reduced tillage with the incorporation of pruning residues and drip-irrigation (RT+PI), on aggregate stability, amount and quality of organic matter fractions and soil organic carbon (OC) sequestration. Our results showed that the incorporation of pruning residues through reduced tillage decreased bulk density and salinity while soil porosity, soil OC and N stocks, and percentage of OC-rich macroaggregates increased compared to the IT system. However, the positive effects of the NT+PM system on soil properties were limited to the topsoil. The IT management system showed the highest values of bulk density and salinity and lower amounts of macroaggregates and soil OC stocks. In conclusion, the combination of pruning residues through the reduced tillage and drip-irrigation was the most effective systems to improve soil structure and OC sequestration and reduced the salt content under Citrus tree orchard in semi-arid soils