



## Effects of conversion from vineyard to tree plantation on humus forms, soil organic carbon stock and other soil properties

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We explored the effects of conversion from vineyard to tree plantation on humus forms, soil organic carbon (SOC) stocks and other soil properties by sampling paired plots in a hilly area of Monferrato (Piedmont, Italy).

The study area is located at Rosignano Monferrato (AL) and includes a vineyard (VY) and a nearby 30-years-old tree plantation (TP) for wood production that replaced an existing vineyard, where eight poplar clones were consociated with other timber species (wild cherry, European ash, manna ash, deodar cedar). The area under study covers 3 ha and extends along a slightly-wavy slope with an average gradient of 15%; according to the WRB classification, soils are Calcaric Cambisols (Loamic).

The impact of land use change on soil properties was evaluated considering the spatial variability of soil characteristics, testing for autocorrelation among the model residuals. Soil sampling was performed from 3 layers (0-10 cm, 10-40 cm and 40-70 cm) at 61 and 69 points in the VY and the TP respectively, to characterize soil pH in water, organic carbon content and SOC stock, C:N ratio, soil texture and total carbonates. The common pedological origin of soils within the study area was verified and confirmed by comparability of soil texture and carbonates content of the deeper layer.

At TP the humus forms were described and classified; the organic horizons were sampled and analyzed for OC content determination.

Statistical analyses showed significant ( $p$ -value < 0.05) differences for all the investigated layers between the considered land uses with regard to pH, SOC stock and C:N ratio.

Our study provided evidence that: (1) the conversion from vineyard to tree plantation resulted in the appearance of organic horizons: the main humus forms in TP were Mull and Amphi; (2) 30 years of tree plantation strongly modified SOC stock, resulting in an increase of 26% in the first 70 cm, which became 42% if the organic layers were included; (2) soil acidification (pH difference of 0.4) and change in SOC type (C:N increase of 1) were also observed in TP compared to VY; and (3) the spatial distribution of soil properties in the VY were affected by erosive and depositional dynamics unlike the TP where vegetation counterbalance erosion.

