

ELS2014 –The Earth Living Skin: Soil, Life and Climate Changes
EGU – SSS Conference
Bari | Italy | 22 – 25 September 2014
ELS2014-84-1
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An integrated study on humus and vegetation to highlight the different capacity to storage organic carbon

Cristina Maria Pilar De Nicola (1), Augusto Zanella (2), Annamaria Testi (1), and Sandro Pignatti (1)
(1) Department of Environmental Biology, University La Sapienza, Orto Botanico, L.go Cristina di Svezia, 24, Roma, (2) Department Land, Environment, Agriculture and Forestry (TESAF), University of Padua, Viale dell'Università 16 - 35020 Legnaro (Padova).

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De Nicola C.* , Zanella A.* *, Testi A.* , Pignatti S.*

* Department of Environmental Biology, University La Sapienza, Orto Botanico, L.go Cristina di Svezia, 24, Roma

** Department Land, Environment, Agriculture and Forestry (TESAF), University of Padua, Viale dell'Università 16 - 35020 Legnaro (Padova).

Soil is a major carbon sink on terrestrial ecosystems. Despite its great importance humus, which constitute the small portion above the soil, has been often neglected in local studies and in international research projects. This work relies on an integrated approach on vegetation/soil/humus study to understand feedbacks and relationships in a Mediterranean forest ecosystem in Central Italy (Castelporziano Reserve). From the methodological point of view it is an innovative approach that integrates the phytosociological method for the vegetation survey with the European Humus Forms Reference Base 2011 method for the humus/soil study. This is one of the first studies of humus forms in a Mediterranean area in which the effectiveness of the recently examined European humus forms (Zanella et al. 2011) is tested: classification based on morpho-genetic characters of diagnostic organic and organo-mineral horizons. The humus forms were investigated in different substrates, soil types, and vegetation units of the Castelporziano Reserve.

Second we aim to highlight the different carbon concentration stocked in the humus/soil among the different vegetation types, particularly between evergreen and deciduous woodlands. Results showed that the carbon stock stored in the organic and organo-mineral horizons of humus and soil, expressed in Tons /Ha, had a wide range for each vegetation type, reflecting the high diversity of the forest vegetation and the variability within each type. The vegetation with the highest value of carbon stock despite its small extension, was represented by humid woodlands dominated by *Fraxinus oxycarpa*, a relic forest type occurring in the dune slacks within the study area, which gives, therefore, an important contribute to the climate warming mitigation. We demonstrated as the humus forms play a role in the carbon sequestration in a forest ecosystem; therefore it may be important to add the evaluation of carbon stock when carbon concentration is evaluated for the soil and above and plants below ground biomass.