EGU2020-13846
https://doi.org/10.5194/egusphere-egu2020-13846
EGU General Assembly 2020

Exploring the effect of varying soil organic matter contents on current and future moisture supply capacities of six Italian soils

Antonello Bonfante[1], Angelo Basile[1], and Johan Bouma[2]
[1]ISAFOM, National Research Council of Italy (CNR), Ercolano (NA), Ercolano, Italy (antonello.bonfante@gmail.com)
[2]Em. Prof Soil Science, Wageningen University, the Netherlands

The Available Soil Water Capacity (AWC) is standard data in most soil databases and expresses soil water contents in the rootzone between field capacity (FC;-33 kPa) and permanent wilting point (WP; -1500 kPa). Literature suggests that increasing the content of soil organic matter (SOM) of a given soil does not significantly increase AWC and this has important implications when estimating soil moisture supply to crops and evaluating the potential for climate mitigation. For most crops, the real FC values vary between -10 and -50 kPa in different soils and WP values between -800 and -1500 kPa. Thus standard values for AWC of FC and WP do not represent field conditions in many soils. When exploring AWC for six Italian soil series, ranging from clay to sandy, AWC values at increasing %SOM were lower in clay soils and higher in sand as compared with actual conditions, which could be explained by considering the shape of the corresponding moisture retention curves. Rather than focus on static AWC values to define moisture supply to plants, real or actual soil moisture supply capacities (MSC) can be obtained by dynamic modeling of the soil-water-atmosphere-plant system, including a “sink-term” indicating a continuous relation between water uptake and negative pressure head of soil water and evaporative demand. Also, only models allow exploration of the effects of future severe IPCC climate scenario RCP 8.5. Thus, studying MSC for the six Italian soil series showed that MSC values were: (i) on average 30% higher than the corresponding AWC; (ii) distinctly different for the six soils; (iii) affected by declines of 1-9% as a result of the effects of future climate scenarios.; (iv) not significantly affected by increases of %SOM when considering climate change, except for the sand. Generalizations as to the effect of future climate scenarios and %SOM on MSC can only be realistic when modeling is performed for soil series in different climate zones. The contribution has been published in Geoderma journal by Bonfante A., Basile A., and Bouma J. (https://doi.org/10.1016/j.geoderma.2019.114079).