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Soil organic carbon and land use in Veneto and Friuli Venezia Giulia (Northern Italy)

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The Italian Ministry of Agricultural Food and Forestry Policies (MiPAAF) has set up a statistical survey aimed to provide the national forecast of yields and areas related to the main Italian agricultural crops (AGRIT). The methodology is based on field surveys and remote-sensed data, covers yearly the whole national territory, and is based on 100,000 observations which are statistically selected from a predefined grid made up of about 1,200,000 georeferenced points.
In 2011-2012 we determined the soil organic carbon content (SOC) of 1,160 sampling points situated in Northern Italy in the plains and hills of Veneto (VEN) and Friuli Venezia Giulia (FVG), for which the land use in the period 2008-2010 was known. Samples have been subdivided in three main classes: arable crops, orchards and fodder crops. SOC was higher in FVG samples (2.48%, n=266) than in VEN samples (1.90%, n=894). The average value (2.03%) is clearly affected by the higher number of VEN samples.
FVG data have been aggregated in continuous crops (maize, soybean, wheat), 2-yr rotations (maize-wheat, soybean wheat, maize-soybean), 3-yr rotations, vineyards (totally, partially and no-grassed), alfalfa, and permanent fodder crops. No significant differences were detected among the land uses due to the low number of samples in some classes, but some important findings do exist from the agronomic point of view. Fodder crops (5.65%), alfalfa (3.41%) and vineyards (2.72%) showed the higher SOC content. SOC was 2.94% and 1.39 % in the grassed and no-grassed vineyards respectively. In the arable crops the average SOC was 2.18%, ranging from 2.32% (soybean-wheat rotation) to 2.03% (continuous soybean). SOC was 2.19% in the continuous maize, with 2.23% in corn and 1.87% in silage maize. The lower values were in the maize-wheat rotation (1.53%) and the continuous wheat (1.47%).
VEN data have been aggregated in continuous crops (maize, soybean and wheat), 2-yr rotations (maize-wheat, soybean-wheat, maize-soybean, soybean-alfalfa, wheat-alfalfa, maize-alfalfa), 3-yr rotations, orchards (mulched, totally, partially and no-grassed), alfalfa, permanent fodder crops, and land use change (from arable to fodder crops and vice versa). The mean value was 1.57% in arable crops, 2.46% in orchards (including vineyards, olive groves, and fruit crops), 3.13% in fodder crops. SOC in orchards was 1.82% (no grassed), 2.46% (grassed), 2.69% (mulched); 2.10 and 2.08% in the 2-yr rotations soybean-wheat and soybean-alfalfa respectively. SOC in the other arable crops was between 1.79% (land use change) and 1.37% (continuous soybean). A higher SOC was shown in VEN samples also when comparing continuous corn (1.69%) and continuous silage maize (1.43%).
Data, even limited to two Regions, have clearly shown the positive contribution to SOC storage of orchards (mainly in grassed and mulched systems) and fodder crops, which are more conservative systems due to the lower soil disturbance from tillage operations; and to a lower extent of cropping systems with alfalfa or other legume crops.