



Aggregate distribution and associated organic carbon influenced by cover crops

Irene Barquero (1), Irene García-González (1), Marta Benito (1), Jose Luis Gabriel (2), Miguel Quemada (2), and Chiquinquirá Hontoria (1)

(1) Departamento de Edafología. Universidad Politécnica de Madrid (Spain)., (2) Departamento de Producción Vegetal: Fitotenia. Universidad Politécnica de Madrid (Spain).

Replacing fallow with cover crops during the non-cropping period seems to be a good alternative to diminish soil degradation by enhancing soil aggregation and increasing organic carbon. The aim of this study was to analyze the effect of replacing fallow by different winter cover crops (CC) on the aggregate distribution and C associated of an Haplic Calcisol. The study area was located in Central Spain, under semi-arid Mediterranean climate. A 4-year field trial was conducted using Barley (*Hordeum vulgare* L.) and Vetch (*Vicia sativa* L.) as CC during the intercropping period of maize (*Zea mays* L.) under irrigation. All treatments were equally irrigated and fertilized. Maize was directly sown over CC residues previously killed in early spring. Composite samples were collected at 0-5 and 5-20 cm depths in each treatment on autumn of 2010. Soil samples were separated by wet sieving into four aggregate-size classes: large macroaggregates ($>2000 \mu\text{m}$); small macroaggregates (250-2000 μm); microaggregates (53-250 μm); and $<53 \mu\text{m}$ (silt + clay size). Organic carbon associated to each aggregate-size class was measured by Walkley-Black Method. Our preliminary results showed that the aggregate-size distribution was dominated by microaggregates (48-53%) and the $<53 \mu\text{m}$ fraction (40-44%) resulting in a low mean weight diameter (MWD). Both cover crops increased aggregate size resulting in a higher MWD (0.28 mm) in comparison with fallow (0.20 mm) in the 0-5 cm layer. Barley showed a higher MWD than fallow also in 5-20 cm layer. Organic carbon concentrations in aggregate-size classes at top layer followed the order: large macroaggregates $>$ small macroaggregates $>$ microaggregates $>$ silt + clay size. Treatments did not influence C concentration in aggregate-size classes. In conclusion, cover crops improved soil structure increasing the proportion of macroaggregates and MWD being Barley more effective than Vetch at subsurface layer.