



Effect of compost supplies on soil bulk density and aggregate stability. Results from a six years trial in two experimental fields in Northern Italy

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Results of a long term trial (2002-2007) on the effect of different organic amendments on topsoil structural properties at the end of the 6th year are presented.

Two soils located in two experimental farms of the Emilia-Romagna region (Northern Italy), namely a silty clay loam Haplic Calcisol under sorghum (*Sorghum bicolor*, L.) continuous cropping, and a silty Calcaric Cambisols under peach (*Persica vulgaris*, Mill.), have been treated with a different amount of organic amendments. Four different treatments were tested plus control: manure ($10 \text{ Mg ha}^{-1} \text{ y}^{-1}$), low input compost (5 and $10 \text{ Mg ha}^{-1} \text{ y}^{-1}$), high input compost (10 and $40 \text{ Mg ha}^{-1} \text{ y}^{-1}$), and no-tillage. In all the plots soil samples were collected three times every year: at the beginning of the growing season, at full crop coverage and after harvest. At each time, samples were collected in three replicates and soil bulk density and aggregate stability were measured. At the end of the 6 years trial 930 bulk density and 405 aggregate stability measurements were made available.

The influence of organic amendments on soil physical properties is different according to the considered soil property and to the different soils. Soil bulk density (BD) shows clear and statistically significant differences among the tested theses, all with a marked seasonality and distinct temporal trends. The overall trends observed in the two soils are coherent with the amount of organic matter distributed in the different theses and with the field operations (tillage mainly), but with a short term effect. More important, over the period of observation and within each year, the treatments exhibit cyclical variations due to climate seasonality. Among the treatments, that with distribution of manure exhibits the weakest seasonal variations and a substantially stable general trend, with BD values slightly lower than those observed for the control. Different effects are also observed on soil aggregates stability, but also in this case a temporal trend is not clearly detectable, suggesting that the amendments have no cumulative effect at least during the 6 years of observations, and the responses are different in the two trials: slightly positive for the low compost supply in the silty clay loam Haplic Calcisol and negative for both low and high compost supply in the silty Calcaric Cambisols. The dominant issue is the seasonal variability of aggregate resistance which is well shown at the site where more data are available. Data also hints an ambiguous behavior of the compost: increasing the amount of applied compost leads to a slight increase in aggregate stability which is then followed by a decrease, as if the aggregation capability of the compost is counteracted by a dispersion effect.