

ABSTRACT

An investigation on the organic matter in Vertisols, and the nature of its association with the large amounts of clay present was undertaken. The effect of the organic matter on CEC and soil colour was interpreted in the light of the observed mechanism of the association between the organic and inorganic soil constituents.

Low amounts of humic substances were extracted with 0.5N NaOH under N_2 which were high in ash contents even after purification. The ratio of HA:FA was high in acid but low in calcareous Vertisols, and the latter materials had larger amounts of acidic functional groups. Studies on the complexation of organic matter to the soil constituents indicated the importance of water and cation bridges, ligand exchange and physical forces in binding. Organic matter was restricted to external surfaces of the clays and in alkaline conditions there were significantly more points of contact with the clay surfaces than in acidic conditions. In the natural complexes, separated and extracted with sonic vibrations and distilled water, the organic matter contributed to the formation of stable silt and coarse clay aggregates.

The restriction of organic matter to the external surfaces resulted in most of the internal surfaces being accessible for cation exchange; therefore the CEC observed was primarily determined by the mineralogy. The presence of large quantities of montmorillonite and exchangeable Ca^{2+} dispersed the organic matter throughout the soil and imparted a dark colour especially when the organic fraction was predominantly HA and even when total organic matter contents were low.