



Effects on soil quality of mineral and organic fertilisation

R. Aromolo and R. Francaviglia

CRA-Istituto Sperimentale per la Nutrizione delle Piante, Rome, Italy
(rosa.francaviglia@entecra.it / Phone: +39 06 7005299)

Intensive farming generally decreases the Soil Organic Matter content and gives rise to a nutrient concentration unbalance in relation to their dynamic in the soils. For this purpose two alfisols of two farms in the Po plain (Mantua, Northern Italy) under intensive agriculture with mineral and organic fertilization plans have been studied. In these soils, the organic matter content, the clay percentage, the total CEC and the exchangeable cations in the epipedon and in the claypan have been compared. Correlation between the physical-chemical properties of the soils and the nutrients availability and between the nutrient concentration in the soil and their potential mobility by leaching has been also evaluated. Further the concentrations of total and available heavy metals have been evaluated in the ploughed horizon and in the deep layers. The concentration of total heavy metals in the soil with mineral fertilization is higher in comparison with that of the soil with organic fertilisation, but the available heavy metals are lower, probably due to the higher clay and organic matter content in the profile. Moreover, in both soils the claypan has acted as a barrier to the migration of both total and available heavy metals. Finally, an indicator of soil global fertility has been tested. This is a complex indicator including two submodels. The first considers soil chemical fertility, i.e. pH, available P₂O₅ and exchangeable K₂O levels in relation to three macro-classes of soil texture. The second submodel takes into account soil intrinsic fertility, and considers the level of organic matter in relation to the yearly coefficient of mineralization (a function of organic matter, clay and total limestone content). This submodel evaluates the number of years N required for the complete mineralization of soil organic matter. Results have shown that global fertility is moderately high in the ploughed layer of both soils, chemical fertility is higher in the soil with mineral fertilization up to 70 cm, and intrinsic fertility is the same.