



Phosphorus content in long-term fertilized soils

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Phosphorous (P) is often considered a limiting nutrient in crop production. However, particularly in intensive livestock and pig farming areas large surplus of P inputs associated with manure application to agricultural soils may result in an excessive P accumulation and a consequent gradual saturation of the soil P-sorption capacity. This event must be discouraged in order to contain possible eutrophication.

In this study we investigated the impact of a long-term fertilization experiment on the accumulation in soil of different form of P. The experiment has been underway since 1964 on the University of Padova Experimental farm. The treatments derived from the factorial combination of 3 types of soil (clay, sandy and peaty) with 3 types of mineral, organic or mixed fertilization, organized in two randomized blocks. A total of 36 lysimeters (surface of 4 m² and 80 cm deep) were cultivated. Fertilization rates were as follows: 0, no fertilization; F1 manure (20 t ha⁻¹ y⁻¹); M1, mineral fertilization (100 kg ha⁻¹ y⁻¹ N); F1M1, manure (20 t ha⁻¹ y⁻¹) + mineral fertilization (100 kg ha⁻¹ y⁻¹ N); F2 manure (40 t ha⁻¹ y⁻¹); M2, mineral fertilization (200 kg ha⁻¹ y⁻¹ N – 100 P₂O₅ – 280 K₂O). Soil samples were taken using a 2-cm diameter auger from 0 to 100 cm depth, every 10 cm. P was analysed in term of total, organic and available (Olsen) phosphorus. Only treatments 0, M2 and F2 were subjected to soil sampling and chemical analyses.

Results showed as the variables were affected by all the factors considered (treatment, soil and depth). Both farmyard manure and mineral fertilization increased the P content in function of soil types. In particular, as concerning the interaction between fertilization and depth, manure as well as mineral fertilization influenced the available P along soil profiles. The long-term fertilizer applications increased the P content at a level which resulted potentially hazardous for the environment.