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PHOSPHORUS SORPTION-DESORPTION IN SOIL AS INFLUENCED BY ORGANIC MATTER, CARBONATES, AND FE-AL OXIDES

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Abstract

Phosphorus (P) reactions in soil are influenced by its chemical components such as organic matter (OM), carbonates, and Fe-Al oxides. This study was aimed to compare the P sorption-desorption processes in two soils in the presence and absence of the aforementioned chemical components. In order to eliminate OM, carbonates, and Fe-Al oxides, the soils were treated with sodium hypochlorite (NaOCl), sodium acetate (NaOAC), and citrate-bicarbonate-dithionate (CBD), respectively. Then, the P sorption-desorption processes were carried out under batch conditions in comparison with the non-treated soils. Results indicated that removal of OM increased the maximum P sorption capacity (Q_{max}) of the soils by 42 and 69 mg kg^{-1}. While, removing of the carbonates decreased the Q_{max} values of the soils by 118 and 67 mg kg^{-1}. Furthermore, the removal of Fe-Al oxides resulted in Q_{max} reduction in the range of 34.3 and 19.2%. The phosphorous desorption sequence in the studied soils was as follows: Fe-Al oxides free > carbonates free > Untreated > organic matter free. The standard P requirement (SPR) in the studied soils increased by 15.7 and 28% after OM removal and decreased by 33.3 and 17.03% and 47.9 and 22.6% after removal of carbonates and Fe-Al oxides, respectively. Overall, the results of the present study revealed that the P sorption capacity of the soils decreased in the presence of the OM and increased in the presence of Fe-Al oxides and carbonates. However, the effects of Fe-Al oxides were significantly higher.

Keywords: calcareous soils, isotherm, phosphorus, sodium hypochlorite

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